

WELCOME

You have a friend at Scott Labs

Welcome to the 2023 edition of the Scott Laboratories' Winemaking Handbook! Our 28th edition continues to bring you best-in-class winemaking products supported by our deep product and process knowledge.

This winemaking handbook is just one of the ways we share our expertise, and it complements the year-round personal support provided by our team and our ever-improving website. On our website you can find all the resources in this book, deeper product information and documentation, articles from previous handbooks, and easy online ordering (see pg 140).

Scott Labs continues to be committed to making winemaking life easier. In this handbook you'll find new tools to simplify yeast rehydration (read about GO-FERM STEROL FLASH™ on pg 54!) and guidance on strategies for limiting the use of sulfur dioxide and animal-based products in winemaking (see pgs 64, 119, and 134). We've also improved the calculation and planning worksheets for yeast rehydration (pgs 36 and 37), nutrient additions (pg 63), restarting alcoholic fermentation (pg 41), and restarting malolactic fermentation (pg 77).

And of course, we continue to provide cool stuff based on real science. Check out our two new yeast! We're excited about LALVIN NBC™, a strain for Chablis-style Chardonnay (pg 31) and love the story of 1895C™, a yeast strain isolated from a 113 year-old bottle of wine (pg 21). Read about all of our new products on pgs 6-7. We can't wait to hear what you think of them.

As always, we look forward to seeing you in person or by video chat, talking with you by phone, and (especially) drinking your wine. You have many friends at Scott Labs. Your success is our success, and we love being part of your community. We hope you have a great 2023.

Fermentation & Enology Dept. GM

SUPPLIERS

At Scott Laboratories, our mission is to advance the longterm success of the specialty beverage industry by providing best-in-class products and services. The suppliers we work with share our mission and reflect our values of education, honesty, and doing the right thing.



SCOTT LABORATORIES has several proprietary brands including SCOTTZYME enzymes, SCOTT'TAN tannins, and THERMIC oak infusion products.



LALLEMAND has been producing yeast since the 1920s when it started supplying fresh bakers yeast in Quebec, Canada. In 1974, Lallemand found a new partner with Scott Laboratories who was looking to produce dry wine yeast from their culture collection. Together, we were the first to bring active dried wine yeast strains to North America.



Lallemand Oenology is the leader in knowledge, education, and product development for winemakers worldwide. With 150 research scientists, 11 research labs, over 70 publications, eight patents, and collaboration with oenological institutions on five continents, Lallemand is committed to the ongoing success of the global wine industry, offering nearly one hundred innovative products including yeast, nutrients, bacteria, and enzymes.



THE INSTITUT OENOLOGIQUE DE CHAMPAGNE (IOC) headquartered in Epernay, France can trace its origins 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 YEAST began in 1923 when Daniel Mills and Sons started the first yeast plant in Cape Town, South Africa. Yeast is now produced in an ISO 9001:2008 certified plant near Durban, South Africa. They produce wine yeast, baker's yeast, distilling yeast, and whiskey yeast.

Anchor Oenology is the leading new world wine brand in the world. We underpin this statement by constantly being a leader when it comes to innovation, world firsts and pioneering inventions including hybrid yeast and yeast blends.



OENOBRANDS comes to us with a distinguished pedigree. Oenobrands provides winemakers with innovative and scientifically sound solutions. This results in revolutionary products from brands such as RAPIDASE®, FINAL TOUCH®, and CLARISTAR®.



ERBSLÖH is a family-based company based in Geisenheim, Germany that brings to the Scott Laboratories portfolio premium bentonites and granulated carbons.



STAVIN, our newest partner, is the world's leading supplier of high-quality oak infusion products for wine. StaVin expands our existing portfolio of innovative and ecologically responsible oak infusion products that help wineries significantly reduce production costs while maintaining the subtle, nuanced flavors of their favorite oak barrel programs.

StaVin is family-run and operated in an artisanal fashion to best craft winemakers' complex and custom flavor profiles. StaVin oak infusion products are produced using time-tested, traditional toasting methods including fire and convection.

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Vendor Notice: The information in this handbook is, to the best of our knowledge, true and accurate. The data and information, however, are not to be considered as a guarantee, expressed or implied, or as a condition of sale of our products. Furthermore, it is understood by both buyer and vendor that wine is a natural product. Circumstances such as fruit quality and cellar conditions are infinitely variable. It is the responsibility of the buyer to adapt the use of our products to such circumstances. There is no substitute for good winemaking practices or ongoing vigilance.

Please Note: Trade of wine between the United States, Canada and other nations and/or trade blocs (such as the European Community) may involve restrictions. In particular these may involve proscription or limitation on the allowable levels of certain ingredients in fermentation aids, fining agents, or stabilization products. To the best of our knowledge, all products described in this handbook when used as directed herein are legal for use in wine made in, and sold, in the United States. Conditions of trade with other nations and trade blocs are subject to

ongoing change beyond the control of Scott Laboratories, Inc. It is the responsibility of users of our products to be informed of current restrictions of other countries or trade blocs to which they wish export and to use only products and product levels which conform to those restrictions.

Published January 2023

NEW PRODUCTS FROM

Yeast

1895C



The Sleeping Beauty Yeast

In June 2008, on the beautiful shores of Lake Zurich, Swiss winemakers got together to taste wines made from the almost extinct white cultivar Räuschling. The oldest of these wines dated back to the 1895 vintage! During the tasting, a prominent microbiologist, Professor Gafner, from the Agroscope-Changins Wädenswil research station was present. His curious nature led him to examine the sediment in some of the oldest bottles. Imagine the excitement when he discovered that the sediment present in a bottle from 1895 was actually Saccharomyces yeast in its dormant form! Thus, the sleeping beauty yeast was born, or rather awakened.

Yeast Nutrient

GO-FERM STEROL FLASH TALLEMAND



Revolutionary rehydration nutrient for use with cool water

GO-FERM STEROL FLASH™ is a revolutionary new rehydration nutrient that allows yeast to be rehydrated with cool water, bypassing the need for acclimatization and significantly shortening the yeast rehydration process. GO-FERM STEROL FLASH is also optimized with respect to the quantity and quality of micronutrients and sterols it provides, contributing to maximal yeast vitality, sustained fermentative power, and aroma production.

SCOTT LABORATORIES

1480 CADER LANE PETALUMA, CA 94954 TEL 707-765-6666 SCOTTLAB.COM **INFO@SCOTTLAB.COM** Yeast

LALVIN





Burgundy selection for modern and fresh aromatic whites and rosés

LALVIN NBC™ is a pure strain of *Saccharomyces* yeast isolated from a Chardonnay fermentation by the Centre Oenologique de Bourgogne (COEB) in France. It was selected for making fresh and refined Chablis-style Chardonnay with enhanced floral, citrus and mineral notes, but is also well-suited for making rosés and Rhône style whites. Wines are described as elegant and well-balanced with fresh fruit aromas and preserved acidity.

Yeast Nutrient

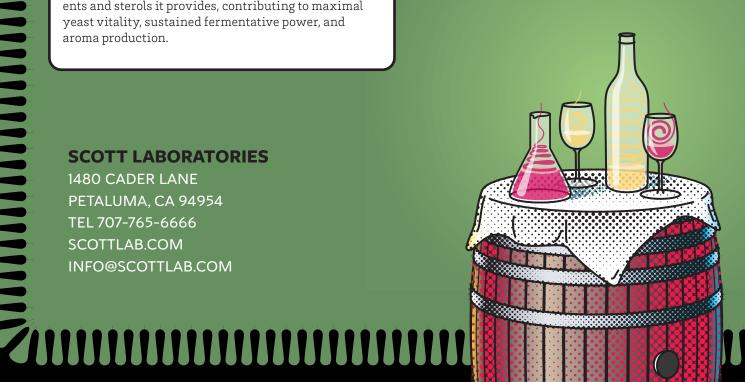
Stimula

STIMULA PINOT NOIR



YAN source that elevates Pinot noir characteristics

STIMULA PINOT NOIR™ is a fermentation nutrient and source of organic nitrogen that optimizes the yeast's ability to reveal varietal compounds and produce fruity aromas. Wines display more black and red fruit aromas, increased floral notes, and increased aromatic complexity. Herbaceous and vegetative notes are masked, and wines have fewer sulfur off-odors like H₂S.



SCOTT LABORATORIES

STAVIN OAK INFUSION PRODUCTS



We have partnered with StaVin, the world's leading supplier of high-quality toasted oak infusion products for wine. StaVin expands our existing portfolio of innovative and ecologically responsible oak infusion products that help wineries significantly reduce production costs while maintaining the subtle, nuanced flavors of their favorite oak barrel programs.

StaVin is family-run and operated in an artisanal fashion to best craft winemakers' complex and custom flavor profiles. StaVin oak infusion products are produced using time-tested, traditional toasting methods including fire and convection.

Fining & Stability

(PURE-LEES|**DELICACY**™)



Mannoprotein for colloidal stability that gently softens harsh tannin and increases fruit intensity in reds

PURE-LEES DELICACY™ is a highly reactive mannoprotein preparation from Saccharomyces cerevisiae that coats harsh tannin to soften mouthfeel, increases fruit expression, and assists with colloidal stability. Although primarily recommended for red wines, PURE-LEES DELICACY can be used in phenolic white and rosé wines.

Tannin

ESSENTIAL ANTIOXIDANT POPULATION PROPERTY AND PROPERTY OF THE PROPERTY OF THE



Tannin for superior oxidation protection

ESSENTIAL ANTIOXIDANT is a highly purified gallnut tannin that protects juice and wine from oxidative damage with minimal impact on mouthfeel. It offers the highest rate of antioxidant protection of all the tannins within our portfolio. ESSENTIAL ANTIOXIDANT can be used on *Botrytis*-compromised grapes, oxygen sensitive juices, or finished wines to preserve color and aromas.

Fining & Stability

FINAL TOUCH TONIC



Mannoprotein for colloidal stability that also protects aroma compounds and can extend shelf-life in whites and rosés

FINAL TOUCH TONIC® is a specialized preparation of liquid mannoproteins with colloidal stabilizing properties that helps to preserve the quality of white and rosé wines. Its powerful reducing capabilities inhibits oxidation thereby protecting wine color and aromas, extending shelf-life and minimizing premature aging. FINAL TOUCH TONIC is completely soluble and can be added prior to final filtration.

Fining & Stability

PURE-LEES™) ELEGANCY™ (ALLEMAND



Mannoprotein for colloidal stability that also fines and removes harsh tannins in reds

PURE-LEES ELEGANCY™ is a highly reactive mannoprotein preparation from Saccharomyces cerevisiae that can bind and remove aggressive tannins, improve wine texture, and assist with colloidal stability. Wines exhibit increased fruitiness and better mouthfeel.

Fining & Stability

FINAL TOUCH GUSTO



Mannoprotein for colloidal stability that enhances aromatic intensity and improves mouthfeel in reds

FINAL TOUCH GUSTO® is a specialized preparation of liquid mannoproteins that improves mouthfeel and can contribute to colloidal stability. Wines display increased aromatic intensity, freshness, and fruitiness with reduced astringency and a smoother, rounder mouthfeel. FINAL TOUCH GUSTO is completely soluble and can be added prior to final filtration.



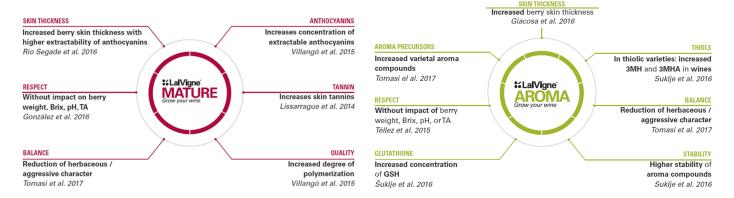
Scott Laboratories is bio-inspired. We love tools that harness the power of microorganisms. LALVIGNE™, by Lallemand Oenology, is a line of wine yeast-based foliar sprays that can elevate your wine starting in the vineyard. Our portfolio of biological solutions based on microorganisms has you covered from vine to wine.



VINEYARD PRODUCTS FOR REGENERATIVE VITICULTURE

Modern winegrowers face many challenges including increasing climatic uncertainty, demands from consumers looking for fewer chemical inputs in the vineyard, and high expectations of grape quality all while maintaining crop yields. Modern winegrowers need innovative vineyard strategies to meet current and future challenges.

Lallemand has developed several innovative products for use in the vineyard. Derived from inactivated yeast, the LALVIGNE® products 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.



WHAT IS REGENERATIVE VITICULTURE?

Regenerative Viticulture is a system of vineyard practices that simultaneously improves wine quality and improves the soil and environment. Regenerative vineyards are more climate resilient and have better production through extreme weather events. Regenerative practices can sequester carbon from the atmosphere into the soil and reduce synthetic fertilizer and chemical inputs.

Healthy soils promote healthy plants, healthy plants in turn feed the soil with root exudates and cycle carbon into the soil. The healthy plant and soil system can be maximized by supplementing with natural and microbial products. Selected microbes promote a healthy root system, improving the plants access to water and nutrients.

Abiotic stress products, such LALVIGNE PROHYDRO®, improve plant growth and performance under unfavorable weather conditions (look for prohydro in 2024 – learn more on pg 11). Inactivated yeast products, like LALVIGNE MATURE and ARO–MA, can improve the ripening process under challenging conditions, limit the use of synthetic ferilizers, and allow more time for vine recovery.

When implemented properly, regenerative practices build a healthier and more resilient vineyard resulting in more consistent and higher quality wines.

LALVIGNE® AROMA **LalVigne CALVIGNE LA

Yeast-based foliar spray for enhancing varietal expression

White grape varieties

LALVIGNE®AROMA can improve wine quality by encouraging the vine to accumulate more varietal aromas and flavors in the grapes, especially in challenging conditions. In thiolic grape varieties such as Sauvignon blanc, LALVIGNE®AROMA increases 3MH aromatic precursors which convert to 3MHA. This results in increased passion fruit aromas and reduces green and underripe flavors and aromas. LALVIGNE®AROMA can also increase glutathione which helps protect aromatic compounds from degrading and makes them more stable for aging. LALVIGNE®AROMA has minimal impact on berry weight, Brix, pH or TA.

Recommended Dosage

1 treatment = 2 applications

1 application = 2.7 lb/acre (1.2 kg/acre)

3 kg LALVIGNE AROMA* – Item #17501* 3 kg LALVIGNE LA** – Item #17500*

Yeast-based foliar spray for phenolic maturity and uniform ripening

Red grape varieties

LALVIGNE® MATURE promotes phenolic maturity and uniform ripening of grapes, especially in challenging conditions. With the use of LALVIGNE® MATURE, there is an earlier and larger window of opportunity for harvesting due to advanced phenolics, tannin ripeness, and decreased harsh green notes. LALVIGNE® MATURE can increase skin thickness which promotes anthocyanin extractability, improved tannin texture, and tannin polymerization. There is minimal impact on berry weight, Brix, pH or TA.

Recommended Dosage

1 treatment = 2 applications

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

1 kg LALVIGNE MATURE* – Item #17511* 1 kg LALVIGNE LM** – Item #17510*

HOW LALVIGNE WORKS

Many physiological changes occur rapidly at the start of ripening (from lag phase to veraison). During this critical ripening period LALVIGNE® MATURE/LM and LALVIGNE® AROMA/LA are sprayed on the vines at 5% veraison and 10–12 days later. Key enzymes which control aromatic precursor and phenolic pathways turn on, allowing an increased and faster flow of these compounds into the berries.

Application timing for LALVIGNE® MATURE/LM and LALVIGNE® AROMA/LA

- 1. First Application: 5%-50% veraison (5% is ideal). At this point, LALVIGNE® activates enzymes that regulate grape aromatic and phenolic precursor pathways. This increases the flow of aromatic and phenolic compounds into the berries while decreasing pyrazines (green/herbaceous characters).
- **2. Second Application:** 7-14 days following the first application (10-12 days is ideal). At this point, LALVI-GNE® continues the flow of aromatic and phenolic compounds to the ripening berries.
- **3. Harvest on Your Schedule:** LALVI-GNE® application results in earlier aromatic and phenolic maturity allowing an earlier harvest. It has minimal impact on other maturity factors such as berry weight, Brix, pH, and total acidity.

^{*}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

ARTICLE

LALVIGNE™ FOR MANAGING UNDERRIPENESS CAUSED BY HOT, DRY GROWING SEASONS

HOW DO HEAT AND DROUGHT CAUSE UNDERRIPENESS?

Drought conditions and heat waves are of increasing concern, especially in West Coast winemaking. Though hot and dry conditions can improve ripening and lower pyrazine levels, intense **post-veraison heat and drought** can have the opposite effect, leading to underripe characters. The hottest conditions can cause some of the slowest ripening and latest harvests.

Grapevine stomata begin to close around 95°F, and higher temperatures can damage the photosynthetic apparatus and impair fruit ripening. After multiple days of high heat, vines may take several days to recover, and some leaves may never recover due to irreversible damage (Keller, 2020). The vine essentially shuts down and ceases ripening during these conditions leading to slow flavor development and slow pyrazine degradation, while dehydration increases sugar and acid concentrations.

PREVENTING UNDERRIPENESS WITH LALVIGNE

LALVIGNE foliar sprays, in addition to canopy and irrigation management, can be a tactic for preventing unbalanced ripening. Used together, the LALVIGNE foliar sprays work to prevent or limit underripeness caused by heat and drought stress, by improving vine adaptation to water stress and stimulating the metabolic pathways that increase accumulation of phenolics and aromatic precursors. At the same time, they also activate the secondary metabolism of the vine that is correlated with increased pyrazine degradation (Suklje et al., 2016).

LALVIGNE PROHYDRO

to increase vine tolerance to water stress

Scott Laboratories is excited to introduce LALVIGNE PROHYDRO to the U.S. in 2024! PROHYDRO naturally increases the

PRODUCT PREVIEW



COMING 2024

tolerance of grapevines to water stress and is a blend of naturally ocurring amino acids derived from wine microorganisms that can be easily assimilated by grapevines. Applied preventatively, the selected blend of amino acids improves vine adaption to water deficits and increases vine recovery after periods of water stress.

The ability to adapt to high water stress improves overall vine function, allowing for increased photosynthesis and transpiration. Ultimately, this helps combat underripeness by stimulating the vine's **primary metabolism** (sugar accumulation and acid degradation). LALVIGNE PROYHDRO also works synergistically with LALVIGNE MATURE/LM and AROMA/LA to improve vine's **secondary metabolism** responsible for physiological/phenolic ripening.

LALVIGNE MATURE/LM & AROMA/LA

to improve physiological/phenolic ripening

LALVIGNE MATURE/LM and LALVIGNE AROMA/LA further stimulate the vine's secondary metabolic pathways to increase





accumulation of phenolic and aromatic precursors and degrade pyrazines. This **combats underripeness and allows an earlier** and larger harvest window.



Scott Laboratories: Celebrating 90 Years of Yeast Production

We were founded as a yeast company in 1933 and were the first to bring active dried wine yeast strains to North America. We partnered with Lallemand in 1974 to dry our strains and have been partners ever since. After nearly a century of yeast research, development, and practical experience, Scott Laboratories and Lallemand know wine yeast better than anyone.



Yeast convert sugar to alcohol, but they can do so much more! At Scott Laboratories, our mission is to provide robust and reliable yeast strains that optimize quality, aromas, and flavors.

SELECTING YEAST FOR SUCCESS

Every fermentation presents different opportunities and challenges. Selecting the right yeast can help ensure a successful outcome. Yeast should be selected in two steps:

STEP 1: Identify which yeast strains are compatible with fermentation conditions

POTENTIAL ALCOHOL	Yeast strains vary in their ability to tolerate alcohol. Alcohol (ethanol) can destabilize yeast cell membranes which interferes with sugar uptake, slows fermentation rate, and makes yeast more sensitive to other stress factors. Ensure that the chosen yeast strain has a higher alcohol tolerance than the potential alcohol of the wine, otherwise a stuck fermentation may occur.
TEMPERATURE	Yeast strains vary in their temperature tolerances. Yeast will become stressed if fermenting at the upper or lower end of the recommended range. If temperature can't be controlled, choose a yeast with a large temperature range. When working with high potential alcohol fermentations, lower fermentation temperatures are recommended.
YEAST ASSIMILABLE NITROGEN (YAN)	Yeast strains vary in their need for yeast assimilable nitrogen (YAN). Our strains are classified as low, medium, or high nitrogen-demand. YAN can be supplemented to meet the nitrogen needs of the yeast strain using fermentation nutrients. In situations where the juice or must is particularly YAN deficient, choose a yeast strain with low nitrogen needs.

STEP 2: Compare the sensory impact of compatible yeast strains

AROMA, FLAVOR, AND MOUTHFEEL IMPACT	Yeast contribute to wine aroma, flavor, and mouthfeel. They can release aromas from grapes as well as produce aromatic compounds. Certain strains also produce polysaccharides and other compounds increasing mouthfeel. Select yeast with traits best suited for the intended wine style.
AVOIDING HYDROGEN SULFIDE (H ₂ S) AND OTHER SULFUR OFF-ODORS	Yeast can produce sulfur off-odors, especially in low nutrient environments. The amount of sulfur off-odors produced varies by yeast strain and fermentation conditions. Some yeast strains have been selectively bred to produce no (or very little) H_2S , even under stressful conditions. Look for the Low H,S and SO, in the yeast descriptions to identify these strains.

There are several tools in this book to help select the best yeast strain for a fermentation:

See pgs 14-19 for the "Quick Guide to Choosing Yeast." See pgs 20-36 for detailed descriptions of each yeast.

YEAST STRAINS FOR WHITE & ROSÉ WINE

			I L/	43	1 3	1 1//	- 111	131		V	V I I		U	NO	'SE		IIAF	_				
Yeast Strain Type Recommended M Mouthfeel Evc Enhanced Varietal Character E Esters Mod Moderate Ntrl Neutral Snstv Sensitive Avg Average	43/43 RESTART	58W3	718	1895C NEW	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	FERMIVIN SM102	ICV D21
Pg#	20	20	20	21	21	21	22	22	23	23	24	24	25	25	25	26	26	26	26	27	27	27
S. cerevisiae cerevisiae		0	0	0			0	0		0	0			0							0	0
S. cerevisiae bayanus	0												0		0	0				0		
Yeast hybrid												0					0	0	0			
Yeast blend					0	0			0													
Alcohol Tolerance ¹	17%	14%	14%	15%	15.5%	15.5%	15%	16%	16%	15%	13.5%	15%	15%	15%	17%	18%	15%	15.5%	15.5%	18%	12%	16%
YAN Requirements ²	Low	Med	Low	Low	Med	Med	Med	High	High	High	Med	Low	Low	High	Low	Low	Med	Med	Med	Med	Med	Med
Temp. Range (°F)³	55-95	54-77	59-85	60-89	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	61-72	61-86
Fermentation Speed	Fast	Mod	Mod	Mod	Fast	Fast	Slow	Mod	Mod	Fast	Slow	Mod	Fast	Mod	Fast	Fast	Slow	Mod	Mod	Mod	Slow	Mod
Competitive Factor	Yes	Ntrl	Snstv	Ntrl	Yes	Yes	Snstv	Snstv	Yes	Ntrl	Snstv	Yes	Yes	Snstv	Yes	Yes	Snstv	Yes	Yes	Ntrl	Yes	Yes
MLF Compatibility	Very Good	Very Good	Very Good	Not Known	Good	Good	Very Good	Good	Below Avg	Avg	NA	Good	Very Good	Good	Good	Avg*	Avg	Very Good	Good	Good	Avg	Good
Sensory Effect	Ntrl	Evc, E, M	E	Evc	Evc, E	Evc	Evc	E, M	Evc, M	Evc, M	E	Evc, M	E	Evc, M	Ntrl	Ntrl	Evc, E		Evc, M, E	Ntrl	E	Evc, M
Fruity (Esters)		٠	٠				٠	٠			٠		٠	٠			٨	٠	٠		٠	٠
Green (Thiols)						٠																
Tropical (Thiols)					٠	٠		٠				٠					٨	٠	٠			
Citrus (Esters And Thiols)					٠	٥											٨		٠			
Floral		٠						٠				٠		٠			۵		٠		٠	
Nutty														٠								
Mineral/Freshness				٠						٠					٠							٠
Spicy		٨					٠	٨														
Mouthfeel		٨						٨	٥	٨		٥		٨				۵				•
Aromatic Whites		٠	٠	٠	٨	۵	٠	٨				٠	٠				۵	٠	٠			•
Chardonnay					٠				٨	٠		٠	٥	٠	٠				٠			٠
Sauvignon blanc					٠	۵						٠			٠		٨		٠		٠	
Rhône Style Whites		٠			٠			٨				٠		٠	٠		٨	٠				•
Rosé			٠								٠		٨				٨	٠				•
Suitable For Barrel Fermentation									٨					٨				٠				٨
No-Low H ₂ S, SO ₂ Production Strains																						
Suitable For Restarting A Stuck Fermentation	٠																			٠		

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

^{2.} YAN requirements refer to how much nitrogen one strain requires relative to the other strains on this chart. See protocol on pg 63.

^{*} Compatible under normal conditions, below average if high SO_2 used at crush.

YEAST STRAINS FOR WHITE & ROSÉ WINE

				J I	J I I	יאי	143			V V I		_ 0	110	JJL	. ••		_				
Yeast Strain Type Recommended M Mouthfeel Evc Enhanced Varietal Character E Esters Mod Moderate Ntrl Neutral Snstv Sensitive Avg Average	ICV D47	ICV D254	ICV GRE	ICV OKAY	ICV OPALE 2.0	ICV SUNROSE	IOC BE FRUITS	IOC BE THIOLS	K1 (V1116)	MSB	NBC NEW	NT 116	QA23	R2	RHÔNE 4600	R-HST	SAUVY	SENSY	VIN 13	VIN 2000	W15
Pg#	28	28	28	29	29	29	29	30	30	31	31	31	32	32	33	33	34	34	35	35	36
S. cerevisiae cerevisiae	0	0	0			0			0		0				0	0	0				0
S. cerevisiae bayanus										0			0	0							
Yeast hybrid				0	0		0	0				0						0	0	0	
Yeast blend																					
Alcohol Tolerance ¹	15%	16%	15%	16%	14%	16%	14%	15%	18%	14.5%	15%	16%	16%	16%	15%	15%	14%	15%	17%	15.5%	16%
YAN Requirements ²	Low	Med	Med	Low	Low	Med	Low	Med	Low	Med	Med	Med	Low	Med	Low	Med	Med	Low	Low	Low	High
Temp. Range (°F)³	60-82	54-82	59-82	54-86	59-86	57-68	54-75	59-77	50-95	57-68	57-68	54-83	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	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	Yes	Yes	Ntrl	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MLF Compatibility	Very Good	Very Good	Very Good	Very Good	Good	Good	Good	Good	Poor	Not Known	Very Good	Good	Very Good	Good	Very Good	Good	Not Known	Very Good	Good	Good	Very Good
Sensory Effect	Evc, M	Evc, M	Evc, M	E	Evc, E	E	E	Evc	E	Evc, M	Evc	Evc, E	Evc	Evc	E	Evc, M	Evc	Evc, M	Evc, E	Evc, E	Evc, M
Fruity (Esters)	٠		٨	٨	٥	٠	٨		٨	٨		٥	٨	٠	٠			٥	٠		٨
Green (Thiols)																	٨				
Tropical (Thiols)								٠		٨		٨	٨		٠				٨	٨	
Citrus (Esters And Thiols)	٠				٥			٠		٨	٠	٨	٨			٠			٠	٨	
Floral	•								٠		٠		٨	٠		٠			٠		
Nutty		٥																			
Mineral/Freshness											٨										
Spicy													۵								
Mouthfeel	۵	۵	٨		۵					۵						۵		۵			٥
Aromatic Whites	۵			٨	۵		٨				٨	۵	٨	٨	۵	۵		۵	•		۵
Chardonnay	۵	٨			۵						٨		٨					۵		٨	
Sauvignon blanc					٥			٨		٨			٨	٨		۵	٠		٨		
Rhône Style Whites	٥	٨	٨	٨	٥						٨				۵	۵					
Rosé	٥		٨		٠	٨	٨	٠			٨				٨			۵			٨
Suitable For Barrel Fermentation	٥	٨									•									٠	
No-Low H ₂ S, SO ₂ Production Strains				٠	٠		٠	٨										٨			
Suitable For Restarting A Stuck Fermentation																					

^{3.} The temperature row 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 RED WINE

				I L/	43 I	31	KA	1147		/1	\LL		IINE	•					
Yeast Strain Type Recommended M Mouthfeel Evc Enhanced Varietal Character E Esters Mod Moderate Ntrl Neutral Snstv Sensitive Avg Average	43	43 RESTART	718	1895C NEW	3001	ALCHEMY III	ALCHEMY IV	ASSMANSHAUSEN (AMH)	ВОХ	BM 4X4	BRG	BRL97	8070	CSM	CVRP	EXOTICS MOSAIC	EXOTICS NOVELLO	FERMIVIN CHAMPION	FERMIVIN MT48
Pg#	20	20	20	21	21	22	22	22	23	23	23	23	24	24	25	26	26	27	27
S. cerevisiae cerevisiae			0	0	0			0	0		0	0	0	0	0				0
S. cerevisiae bayanus	0	0																0	
Yeast hybrid																0	0		
Yeast blend						0	0			0									
Alcohol Tolerance ¹	17%	17%	14%	15%	15%	15.5%	15.5%	15%	16%	16%	15%	16%	17%	15%	16%	15.5%	15.5%	18%	15%
YAN Requirements ²	Low	Low	Low	Low	Med	Med	Med	Med	Med	High	High	Med	Med	Med	Med	Med	Med	Med	Low
Temp. Range (°F) ³	55-95	55-95	59-85	60-89	54-90	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	Mod	Fast	Fast	Slow	Mod	Mod	Fast	Mod	Fast	Mod	Mod	Mod	Mod	Mod	Mod
Competitive Factor	Yes	Yes	Snstv	Ntrl	Yes	Yes	Yes	Snstv	Snstv	Yes	Ntrl	Yes	Yes	Yes	Yes	Yes	Yes	Ntrl	Ntrl
MLF Compatibility	Very Good	Very Good	Very Good	Not Known	Very Good	Good	Good	Very Good	Avg	Below Avg	Avg	Avg	Very Good	Good	Very Good	Very Good	Good	Good	Very Good
Sensory Effect	NTRL	NTRL	Е	Evc	Evc	Evc	E, M	Evc	Evc, M	Evc, M	Evc, M	Evc	Evc, M	Evc	Evc, M	Evc, M	Evc, M, E	NTRL	Evc, M
Cocoa/Caramel																٨			
Floral						٠				•						٨			٠
Freshness				٠							٠								
Fruit-Black													٠	٨	٠		•		٨
Fruit-Red	٠		٠		٠	٠	٠	٠		•		٠	٠	٨	٠	٠	•		٥
Fruit-Jammy									٠	٥		٠	٠		٠				
Savory					٠			٠		٠									
Spicy								•	٠	•	٠			٠			•		•
Mouthfeel Impact (Roundness And/Or Structured)					٠	٠	•		٠	٠	٠		•		٠	٠	•		٠
Minimizes Herbaceousness						۵	۵		۵					٠	۵		٨		
No-Low H ₂ S, SO ₂ Production Strains																			
Cabernet Sauvignon						٠			٠	۵			٠	٨	٠				
Merlot									٨										
Pinot noir			٠		۵		٨	٠			٠	۵							
Light-Bodied Reds			٨		٥		٨	٥			٥	٥		٨		٨			٥
Medium-Bodied Reds				۵		•	٥	۵	٨	•		•		٥			•		•
Full-Bodied Reds	٥					•			٨	٥			٨		٥				
Suitable For Restarting A Stuck Fermentation		•																٨	

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

^{2.} YAN requirements refer to how much nitrogen one strain requires relative to the other strains on this chart. See protocol on pg 63.

YEAST STRAINS FOR RED WINE

			T	LA.	טונ		4114	ЭГ	UK	KEL	J VV	HIAL	-					
Yeast Strain Type Recommended M Mouthfeel Evc Enhanced Varietal Character E Esters Mod Moderate Ntrl Neutral Snstv Sensitive Avg Average	ICV D21	1CV D80	ICV D254	ICV GRE	ICV OKAY	IONYS _{WF}	MT	NT 116	NT 202	PERSY	RC212	RHÔNE 2226	RP15	SYRAH	173	TANGO	VRB	W15
Pg#	27	28	28	28	29	30	31	31	32	32	33	33	34	34	35	35	36	36
S. cerevisiae cerevisiae	0	0	0	0		0	0				0	0	0	0		0	0	0
S. cerevisiae bayanus															0			
Yeast hybrid					0			0	0	0								
Yeast blend																		
Alcohol Tolerance ¹	16%	16%	16%	15%	16%	16%	15%	16%	16%	16%	16%	18%	17%	16%	16%	15.5%	17%	16%
YAN Requirements ²	Med	High	Med	Med	Low	Very High	Med	Med	Med	Low	Med	High	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	64-82	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
MLF Compatibility	Good	Good			Very Good		Avg	Good		Very Good		Below Avg			Below Avg			Very Good
Sensory Effect	Evc, M	Evc, M	Evc, M	Evc, M	E E	M	Evc, M	Evc, M	Evc, E	Evc, M	Evc	Evc, M	Evc	Evc	E, M	Evc	Evc, M	Evc, M
Cocoa/Caramel	LVG, IVI	LVG, IVI	LVG, IVI	LVG, IVI	L	IVI	LVG, IVI	LVG, IVI	LVG, L	LVG, IVI	LVG	LVG, IVI	LVC	LVG	L, IVI	LVU	LVG, IVI	LVG, IVI
Floral	•			•			•							•		•		
Freshness	•			•		•	•			•			•	•	•	•		
Fruit-Black			•	•		•		•	•	•		•			<u> </u>	•		
Fruit-Red				•	•		•	•	4	•	•		•	٨	•	•	•	_
Fruit-Jammy	•	•	•									•	•				•	<u> </u>
Savory									•					٨				
Spicy		•	•				•			•	_	•		•		•		
Mouthfeel Impact (Roundness And/Or Structured)	٠	•	•	•		•	•	٠		•		•			٠		•	•
Minimizes Herbaceousness			٨	٠														
No-Low H ₂ S, SO ₂ Production Strains					٠					•								
Cabernet Sauvignon	۵	٨	٨			•			٠				•					
Merlot							٨			٠					٨	٨		
Pinot noir											٨							٨
Light-Bodied Reds				۵						٨	٥							٠
Medium-Bodied Reds	۵	٥	٠	٨	٥	۵	٨	٥		٨	۵	٨	٨	۵	٨	٨		
Full-Bodied Reds	٨	٨	٨		٥	٨	٨	٨	٠	٨		٠	•	٨	٥		٠	
Suitable For Restarting A Stuck Fermentation																		

^{3.} The temperature row indicates general performance possibilities. It is not a substitute for sound winemaking. Yeast may be stressed or die if tempera-tures 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

ILAJI	211	\	43 I		, \forall	VILI	110	\sim 14	U I	ם ו ו	IVIL	, v v			OL	1 I V /	71/2	•
Recommended M Mouthfeel Evc Enhanced Varietal Character E Esters Mod Moderate Ntrl Neutral Snstv Sensitive Avg Average	58W3	718	ALCHEMY I	CROSS EVOLUTION	CVW 5	CY3079	ELIXIR	EXOTICS MOSAIC	FERMIVIN SM102	ICV D47	ICV OPALE 2.0	IOC BE FRUITS	IOC BE THIOLS	NT116	QA23	SAUVY	VIN13	VIN2000
Pg#	20	20	21	24	25	25	26	26	27	28	29	29	30	31	32	34	35	35
Alcohol Tolerance ¹	14%	14%	15.5%	15%	15%	15%	15%	15.5%	12%	15%	14%	14%	15%	16%	16%	14%	17%	15.5%
YAN Requirements ²	Med	Low	Med	Low	Low	High	Med	Med	Med	Low	Low	Low	Med	Med	Low	Med	Low	Low
Temp. Range (°F)³	54-77	59-85	56-61	58-68	57-82	59-77	57-77	64-83	61-72	60-82	59-86	54-75	59-77	54-61	59-90	57-68	54-61	55-61
Fermentation Speed	Mod	Mod	Fast	Mod	Fast	Mod	Slow	Mod	Slow	Mod	Mod	Mod	Fast	Fast	Fast	Mod	Fast	Mod
Competitive Factor	Ntrl	Snstv	Yes	Yes	Yes	Snstv	Snstv	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
MLF Compatibility	Avg	Very Good	Good	Good	Very Good	Good	Avg	Very Good	Avg	Very Good	Good	Good	Good	Good	Very Good	Not	Good	Good
Reduces Malic Acid	9	₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩ ₩	4004	0000	6000		9	6000	9	6000	4004	4004	0000	0000	6000	Known	uoou	4004
Sensory Effect	Evc, E, M	E	Evc, E	Evc, M	E	Evc, M	Evc, E	Evc, M	E	Evc, M	Evc, E	E	Evc	Evc, E	Evc	Evc	Evc, E	Evc, E
			LVG, L	LVG, IVI			LVG, L		L				LVG			LVC		LVG, L
Fruity (Esters) Tropical (Thiols)	•	•	•	۵	٠	•	•	•		•	•	•	•	•	•		•	•
Citrus (Esters And Thiols)			•	•			•	•		•	•		•	• •	•		•	•
Floral	•		•	•		٠	•		•	•	•		•	•	•		•	•
Spicy	•			•		•	•		•	•					•		•	
Mouthfeel	•			۵		۵		•		٠	۵							
Aromella	•		٨	_			٨	•	•	٨			٠		٠		٠	
Blanc Du Bois			•		٠		•					٨	•		•	٠	•	•
Brianna	۵	٨			٨		۵				۵	٨		۵				۵
Cayuga White		٨		٨	٨		٨		٨	٥	٥	٨		٨	٨		٥	٨
Chardonnel			۵	۵	٨	٨				٨	۵				۵		٨	٨
Edelweiss	۵	٨			۵		۵		۵		۵	٨		۵				۵
Frontenac blanc		٨	٥		٥		٥				۵		٥		٥	٨	٨	٨
Frontenac gris		٨		۵	۵		۵	۵	۵	۵	۵	٨			۵	٨		
Itasca	•	٨			٨							٨			٨		۵	٨
La Cresent	۵	٨	۵				۵	۵			٥		٨		٨	٨	٥	
Muscadine					٨										٨		۵	
Rosé		٨		٨			٨		٨		٥	٠	٨					
Seyval blanc			٨				٨	٨							٠	٠		٨
Traminette	۵		٥				٥				٠		٨		٨	٠		٨
Vidal blanc			٨		٨		٨				٥							٨
Vignoles	•	٨	۵	٨	٨		٨		٨		٥		٨	٨	٨		٥	

^{1.} The alcohol tolerance row indicates performance possibilities in good circumstances and conditions. Alcohol tolerance may vary as circumstances and conditions vary.

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 Vitis rotundifolia (Muscadine) and V. 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 reminiscent of their European ancestors. In addition to viticultural practices, wine style can

^{2.} YAN requirements refer to how much nitrogen one strain requires relative to the other strains on this chart. See protocol on pg 63.

YEAST	ST	RAI	NS	FO	R A	ME	RIC	CAN	18	HY	BRI	D _R	RED	CU	LTI	VAI	RS	
♦ Recommended M Mouthfeel Evc Enhanced Varietal Character Esters Mod Moderate Ntrl Neutral Snstv Sensitive Avg Average	718	3001	ALCHEMY III	ALCHEMY IV	BM 4X4	8010	CSM	CVRP	EXOTICS MOSAIC	ICV D254	ICV GRE	NT 202	PERSY	RC212	SYRAH	173	VRB	W15
Pg#	20	21	22	22	23	24	24	25	26	28	28	32	32	33	34	35	36	36
Alcohol Tolerance ¹	14%	15%	15.5%	15.5%	16%	17%	15%	16%	15.5%	16%	15%	16%	16%	16%	16%	16%	17%	16%
YAN Requirements ²	Med	Low	Med	Med	High	Med	Med	Med	Med	Med	Med	Med	Low	Med	Med	Low	Med	High
Temp. Range (°F) ³	59-85	54-90	61-82	61-82	64-82	57-90	59-90	64-86	64-83	54-82	59-82	60-82	60-86	60-86	59-90	65-90	59-82	50-83
Fermentation Speed	Mod	Mod	Fast	Fast	Mod	Fast	Mod	Mod	Mod	Mod	Mod	Fast	Mod	Mod	Mod	Mod	Mod	Mod
Competitive Factor	Yes	Snstv	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Ntrl	Yes	Yes	Yes	Ntrl	Yes	Yes	Ntrl	Yes
MLF Compatibility	Very Good	Very Good	Good	Good	Below Avg	Very Good	Good	Very Good	Very Good	Very Good	Very Good	Very Good	Very Good	Good	Avg	Below Avg	Very Good	Very Good
Sensory Effect	E	Evc	Evc	E, M	Evc, M	Evc, M	Evc	Evc, M	Evc, M	Evc, M	Evc, M	Evc, E	Evc, M	Evc	Evc	E, M	Evc, M	Evc, N
Fruit-Black						•	۵	•		•		•	•			•		
Fruit-Red	۵	۵	٨	۵	٨	٨	٨	٠	۵		٠	٨	٠	٠	٥	٠	٥	٨
Spicy					٨		٨			٠			٨	٠	٨			
Mouthfeel Impact (Roundness and/or Structured)		٠	٠	٠	٠	٠		٠	٠	٠	٠		٠			٠	٠	٠
Minimizes Herbaceousness				٥	٨		٨			٨	٠							
Reduces Malic Acid Content	٠																٠	
Baco noir	٠	۵		٠					۵			٨	٠	٠				
Black Spanish				۵	٨	٨	۵	٠			٠		٠			٠		
Chambourcin	٨	۵		٠	٠		٨	٠		٠		٠	٠	٠			٥	٨
Concord	٨			٠									٠					
Crimson Pearl			۵	۵			۵		۵	٠		٠	٠	٠		٠		
Frontenac	٠	٠		٠	٠		٠		٠			٠	٨	٠				
Maréchal Foch		٨		٠					٥		٠	٨	٠	٠				
Marquette	٨	٨		۵	٨	٨	٨		٨	٨			٨	٨		٨		٨
Noiret			٨	٨		٨	٥	٥	٥		٨	٨	٨		٥		٨	٥
Norton		٠	٨	٠		٠	٠	۵	۵	٨		٨	٨				٠	
Petite Pearl	٥		٨	٥		٨				٠		٥	٨	٨			٥	
St. Croix				۵		۵	۵			٥	٠	٥	٨					
Verona	٨	۵	٨	۵						٨		٨	٨					

^{3.} The temperature row 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.

HYBRID AND NON-VINIFERA WINES (CONTINUED)

be influenced by the yeast strain. Yeast can enhance flavors, aromas, mouthfeel and varietal expression. If the yeast 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 poly-

saccharides 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.

SACCHAROMYCES YEAST

43



Fructophilic yeast for high sugar fermentations

Alcohol Tolerance: 17%
Nitrogen Needs: LOW

Temp. Range: 13-35°C (55-95°F)

Frequently used in high °Brix musts, Zinfandel, Syrah

UVAFERM 43^{TM} is fructophilic, making this yeast suitable for use in high maturity grapes where the fructose concentration is generally higher than the glucose concentration.

- Wines display red berry aromas and have good color and tannin intensity
- Fast fermentation onset and fast fermentation kinetics
- Saccharomyces cerevisiae bayanus strain
- Isolated by Lallemand Oenology in collaboration with the research center of Inter-Rhône, France.

500 g - Item #15134*

10 kg - Item #15140*

43 RESTART



Pre-acclimated fructophilic yeast for restarting stuck fermentations

Alcohol Tolerance: 17%

Nitrogen Needs: LOW

Temp. Range: 13-35°C (55-95°F)

Frequently used in restarting stuck fermentations

UVAFERM 43 RESTART $^{\text{TM}}$ is an optimized and pre-acclimated UVAFERM 43 that can efficiently restart a stuck alcoholic fermentation.

- Effectively consumes residual fructose and glucose under challenging conditions
- Acclimation during the production of UVAFERM 43 RESTART results in cells that are more robust, acclimate more quickly, and have a lower mortality rate after inoculation
- For best results, use the 43 RESTART protocol for stuck wines (pg 40)
- · Saccharomyces cerevisiae bayanus strain
- Strain originally isolated by Lallemand Oenology in collaboration with Inter-Rhône in France and produced via an innovative process developed by Lallemand Oenology.

500 g - Item #15223*

10 kg - Item #15240*

58W3



Spicy and fruity aromatic white wines

Alcohol Tolerance: 14%

Nitrogen Needs: MEDIUM

Temp. Range: 12-25°C (54-77°F)

Frequently used in Pinot gris, Riesling, Muscat, Gewürztraminer, aromatic whites, cider VITILEVURE 58W3™ produces high levels of varietal aroma-releasing enzymes which leads to increased spicy, floral, and fruity aromas.

- Wines are well-balanced with well-integrated acidity
- Moderate fermentation rate, relatively cold-tolerant, and low $\rm H_2S$, and foam production
- Saccharomyces cerevisiae cerevisiae strain
- Isolated by the National Research Institute for Agriculture, Food and the Environment (INRAe) in Alsace, France.

500 g – Item #15630*

10 kg - Item #15631*

71B



Softens high malic acid grapes

Alcohol Tolerance: 14%

Nitrogen Needs: LOW

Temp. Range: 15-29°C (59-85°F)

Frequently used in Pinot gris, Riesling, Grenache, rosés, grapes with high malic acid, hybrids, fruit-forward reds, cider LALVIN 71B™ is known for fermenting fruity red wines, rosés, and semi-sweet whites

- Produces stable fruity and floral (rose) aromas
- Softens mouthfeel by metabolizing malic acid and absorbing tannins onto the yeast cell wall
- Has a high demand for survival factors so rehydration in GO-FERM PROTECT EVOLUTION™ or GO-FERM STEROL FLASH™ is highly recommended
- Saccharomyces cerevisiae cerevisiae strain
- Isolated and selected by National Research Institute for Agriculture, Food and the Environment (INRAe) in Narbonne, France

500 g - Item #15059*

10 kg - Item #15078*

NEW <

1895C



The sleeping beauty yeast

Alcohol tolerance: 15%

Nitrogen needs: Low

Temp. Range: 16-32°C (60-89°F)

Frequently used in reds, whites, cider, sparkling base wines, fruit wines

1895C™ was isolated from a bottle of Räuschling (white) wine made in 1895.

- This strain is suitable for most wine types where clean aromatics and varietal expression are desired
- · Steady fermenter with a short lag phase
- Low volume of lees due to smaller cell size
- Low foaming strain with very low production of volatile acidity and H_oS

THE STORY OF THE SLEEPING BEAUTY YEAST

In June 2008, on the beautiful shores of Lake Zurich, Swiss winemakers got together to taste wines made from the almost extinct white cultivar Räuschling. The oldest of these wines dated back to the 1895 vintage! During the tasting, a prominent microbiologist, Professor Gafner, from the Agroscope-Changins Wädenswil research station was present. His curious nature led him to examine the sediment in some of the oldest bottles. Imagine the excitement when he discovered that the sediment present in a bottle from 1895 was actually *Saccharomyces* yeast in its dormant form! Thus, the sleeping beauty yeast was born, or rather awakened.

500 g - Item #15655*

3001



Burgundy selection for enhanced varietal expression in Pinot noir

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 12-32°C (54-90°F)

Frequently used in Pinot noir, Chambourcin VITILEVURE 3001[™] is cold-tolerant and implants exceptionally well especially in musts that have undergone pre-fermentation cold maceration (cold-soaks).

- Wines are noted for their balanced mouthfeel, soft tannin expression, and fresh and fruity aromas
- Tolerant to high levels of total SO
- Saccharomyces cerevisiae cerevisiae strain
- This strain is from the prestigious Côte de Nuits region of Burgundy, France

500 g - Item #15682*

ALCHEMY I



Alcohol Tolerance: 15.5%

Nitrogen Needs: MEDIUM

Temp. Range: 13-16°C (56-61°F)

Frequently used in Sauvignon blanc, Chardonnay, Chenin blanc, Riesling, Pinot gris, Rhône whites, aromatic whites, cider ALCHEMY I is a complementary blend of yeast strains that focus on thiol revelation, thiol conversion, and ester production, resulting in intensely fruity wines.

- Produces aromatically complex wines that express tropical, citrus, and floral varietal-based aromas
- Temperature management is essential, and therefore barrel fermentation should be avoided
- Blend of Saccharomyces cerevisiae wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

1 kg - Item #15174*

ALCHEMY II

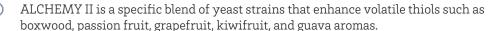


Alcohol Tolerance: 15.5%

Nitrogen Needs: MEDIUM

Temp. Range: 13-16°C (56-61°F)

Frequently used in Albariño, Sauvignon blanc, Chenin blanc, Rhône whites



- ALCHEMY II ferments fast and temperature management is critical
- ALCHEMY II will produce acetic acid (VA) under difficult conditions: pH <3.2, turbidity <80 NTU, low YAN, temperatures <59°F (15°C)
- Blend of Saccharomyces cerevisiae wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

1 kg - Item #15177*

ALCHEMY III

Fruity and floral aroma production in bold and high alcohol reds

> **Alcohol Tolerance: 15.5%** Nitrogen Needs: MEDIUM Temp. Range: 16-27°C (61-82°F)

Frequently used in Cabernet Sauvignon, Malbec, Zinfandel, Tempranillo, Grenache, Petit Verdot, structured reds ALCHEMY III is a tailored blend of yeast strains that are strong fermenters and high fruity and floral aroma producers.

- Aromas produced include 2-phenylethanol (rose), phenylethyl acetate (fruity and floral), \(\mathbb{S}-ionone \) (raspberry), and acetate esters (fruity and candy)
- Wines display good structure and mouthfeel
- Can mask green characters (methoxypyrazines)
- Good fermenter, produces minimal SO2 and very low levels of foam
- Blend of *Saccharomyces cerevisiae* wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

1 kg - Item #15230*

ALCHEMY IV

Intense red fruit aroma production for medium-bodied reds

Alcohol Tolerance: 15.5% Nitrogen Needs: MEDIUM Temp. Range: 16-29°C (61-82°F)

Frequently used in Pinot noir, Syrah, Cabernet Franc, Sangiovese, fruit-forward reds



ALCHEMY IV is a formulated blend of complementary yeast strains that promote intense red fruit characters such as cherry, red currant, raspberry, and pomegranate.

- · Produces stable and long-lasting fruity ethyl esters (ethyl hexanoate), and elevates varietal terpenes
- · Masks herbaceous, vegetal, and unripe flavors while producing smooth, easy-drinking, round wines
- Good fermenter, produces minimal SO_2 and high levels of glycerol (8–11 g/L)
- Blend of Saccharomyces cerevisiae wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

1 kg - Item #15231*

ASSMANSHAUSEN (AMH)



Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 20-30°C (68-86°F)

Frequently used in Pinot noir, Zinfandel, Riesling, Gewürztraminer, Petite Sirah



ENOFERM ASSMANHAUSEN (AMH)™ is a color-friendly strain with a long lag phase, allowing for the expression of indigenous microflora to enhance complexity.

- · Promotes spicy (clove, nutmeg) and fruit flavors and aromas
- Long lag phase with a slow to medium fermentation rate
- If desired, lag phase can be reduced and fermentation rate increased if AMH is added to 10% of the total juice or must volume for eight hours, then added into full volume
- Rehydration in GO-FERM PROTECT EVOLUTION™ or GO-FERM STEROL FLASH™ and fermentation nourishment is essential as juice or must may be nutritionally deficient due to consumption by native yeast and bacteria
- · Saccharomyces cerevisiae cerevisiae strain (reclassified from S. kudriavzevii in 2021)
- · Originating from the Geisenheim Research Institute, Germany

500 g - Item #15632*

10 kg - Item #15633*

BA11

microflora



Strong fermenter for aromatic white wines

Alcohol Tolerance: 16% Nitrogen Needs: HIGH **Temp. Range:** 15-25°C (59-77°F)

Frequently used in Riesling, Viognier, Pinot blanc, Gewürztraminer, rosés, Muscat, Rhône whites, aromatic whites, cider

LALVIN BA11™ promotes clean aromatic characteristics with subtle notes of spice, pineapple, citrus, and stone fruit. Can enhance floral notes in certain varietals.

- · Fermentation starts quickly and attention should be paid to nutrient requirements, especially in high sugar juice
- · Will release polysaccharides quickly with lees stirring, which increases mouthfeel softness and roundness
- Saccharomyces cerevisiae cerevisiae strain
- Selected in 1997 near the Estação Vitivinicola de Barraida, Portugal

500 g - Item #15117*

BDX

LALLEMAND YSEO

Steady fermenter for enhanced varietal character in Bordeaux reds

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 18-30°C (64-86°F)

Frequently used in Merlot, Cabernet Sauvignon, Zinfandel, Petit Verdot, structured reds

UVAFERM BDX™ is a reliable fermenter that enhances varietal characteristics in Bordeaux-style reds and emphasizes spicy and jammy notes.

- Wines have good color and phenolic structure with increased mouthfeel
- Does not generate a lot of heat during fermentation
- Saccharomyces cerevisiae cerevisiae strain
- · Selected from the Institut Pasteur strain collection in Paris, France

500 g - Item #15634*

10 kg - Item #15635*

BM 4X4



Aromatic complexity and mouthfeel in reds and whites

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 18-28°C (64-82°F)

Frequently used in Sangiovese, Cabernet Sauvignon, Grenache, Zinfandel, Chardonnay, Italian reds LALVIN BM 4X4[™] produces aromatically complex wines with round mouthfeel due to the production of esters and the release of polysaccharides. Sensory descriptors include jam, cherry liqueur, sweet spice, licorice, cedar, floral, and earthy.

- LALVIN BM 4X4[™] is a scientifically formulated blend of two yeast strains: one known for aromatic complexity (LALVIN BM45[™]) and another for fermentation reliability. BM 4x4 has the benefits of both
- White wines are fruity and round due to the high levels of esters and polysaccharides produced
- Red wines have increased mouthfeel and improved color stability due to the release of unusually high levels of polyphenol-reactive polysaccharides
- Malolactic fermentation compatibility can be enhanced by good nutritional practices for both alcoholic and malolactic fermentation
- · Saccharomyces cerevisiae cerevisiae strains
- Selected by the Consorzio del Vino Brunello de Montalcino and the University of Siena, Italy

500 g - Item #15176*

10 kg - Item #15200*

BRG



Classic strain for Burgundy varietals

Alcohol Tolerance: 15%

Nitrogen Needs: HIGH

Temp. Range: 18-31°C (64-88°F)

Frequently used in Chardonnay, Pinot blanc, Pinot noir

LEVULINE BRG™ is a reference strain for Burgundian winemakers for both white and red wines with good aging potential.

- · White wines are noted for citrus and floral aromas
- · Red wines display ripe, dark fruit characteristics with good color
- Both red and white wines display increased mouthfeel and roundness due to polysaccharide release
- · Fast fermenter with high nutritional needs
- · Saccharomyces cerevisiae cerevisiae strain
- Isolated in Burgundy at the Institut Universitaire de la Vigne et du Vin (IUVV) laboratory in Dijon, France

500 g - Item #15669*

10 kg - Item #15670*

BRL97

LALLEMAND

Enhanced color stability and structure in color-sensitive wines

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 17-29°C (62-85°F)

Frequently used in Pinot noir, Zinfandel, Merlot, Malbec, Grenache, Nebbiolo LALVIN BRL97™ is particularly suited to thin-skinned, low color-potential red varietals or wines that are sensitive to color loss during aging.

- Enhances varietal aromatic expression and adds complex notes of red fruit, berries, and spice
- Fermentation starts quickly but proceeds at a moderate rate
- · Saccharomyces cerevisiae cerevisiae strain
- Isolated at the University of Torino in Italy from a Nebbiolo fermentation

500 g - Item #15102*

10 kg - Item #15205 *

CEG (EPERNAY II)

LALLEMAND

Sweet and semi-sweet wine production

Alcohol Tolerance: 13.5%

Nitrogen Needs: MEDIUM

Temp. Range: 15-25°C (59-77°F)

Frequently used in rosés, whites

UVAFERM® CEG often slows or stops under stressed conditions, making it ideal for semi-sweet white or rosé wine production.

- Produces fruity esters
- Under normal fermentation conditions it ferments slow but steady
- Saccharomyces cerevisiae cerevisiae strain
- · Isolated by the Geisenheim Research Institute, Germany

500 g - Item #15081*

10 kg - Item #15093*

CLOS



Aromatic complexity and mouthfeel in big reds

Alcohol Tolerance: 17%

Nitrogen Needs: MEDIUM

Temp. Range: 14-32°C (57-90°F)

Frequently used in Cabernet Sauvignon, Syrah, Grenache, Tempranillo, Zinfandel, Petite Sirah, Barbera, Petit Verdot, Malbec, structured reds LALVIN CLOS™ was selected for its ability to enhance aromatic complexity, structure, and mouthfeel in full-bodied red wines.

- Wines display nice berry aromas and have good tannin intensity, full mid-palate, and ageable tannins
- Good implantation rates, but can be slow to start fermentation in cold must which makes for a simulated "cold soak"
- Reliable fermenter and low H₂S, SO₂, and VA producer
- Saccharomyces cerevisiae cerevisiae strain
- Isolated by the University of Rovira i Virgili in Spain from the Priorat region

500 g - Item #15201*

10 kg - Item #15204*

CROSS EVOLUTION



Strong fermenter for round, rich, aromatic whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 13-20°C (58-68°F)

Frequently used in Chardonnay, Gewürztraminer, Pinot blanc, Riesling, Sauvignon blanc, rosés, Rhône whites, aromatic whites CROSS EVOLUTION $^{\text{\tiny{TM}}}$ can be used in any white or rosé wine to increase varietal aromatic expression and mouthfeel.

- Wines display floral, citrus, and tropical fruit aromas and have a rich, complex mouthfeel
- · Strong fermenter even under challenging conditions of high alcohol and low YAN
- · Saccharomyces cerevisiae cerevisiae hybrid
- From the Institute for Wine Biotechnology at the University of Stellenbosch, South Africa

500 g - Item #15640*

10 kg – Item #15641*

CSM



Minimizes greenness and combats color instability in under-ripe fruit

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 15-32°C (59-90°F)

Frequently used in Cabernet Sauvignon, Cabernet Franc, Grenache, Merlot, Sangiovese, Petit Verdot

ENOFERM CSM™ has been known to reduce vegetal aromas, enhance mid-palate volume, and stabilize color.

- · Wines show intense aromas of berries, spice, and licorice
- Fermentation starts quickly, but can produce $\rm H_2S$ if vitamins and/or nitrogen is deficient
- · Saccharomyces cerevisiae cerevisiae strain
- Selected by the Institut Français de la Vigne et du Vin (IFV) in Bordeaux in cooperation with Conseil Interprofessionnel du Vin de Bordeaux (CIVB-Bordeaux)

500 g - Item #15638*

10 kg - Item #15639*

CVRP

LALLEMAND

Produces rich red wines with round mouthfeel and smooth tannin

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 18-32°C (64-90°F)

Frequently used in Cabernet Franc, Cabernet Sauvignon, Merlot, Petite Sirah, Tempranillo $CVRP^{\text{\tiny TM}}$ is ideal for full-bodied reds where varietal definition, smooth mouthfeel, and sweet tannin expression are desired.

- Yeast overproduces polysaccharides resulting in round, full wines with decreased astringency and bitterness, stable color, and complex, ripe fruit flavors
- Fermentation starts quickly but proceeds at a moderate rate
- · Saccharomyces cerevisiae cerevisiae strain
- Selected in Rioja, Spain by the Centro Superior de Investigaciones (CSIC)

500 g - Item #15207*

10 kg - Item #15208*

CVW5



Fresh and fruity white and rosé wines under difficult fermentation conditions

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 14-27°C (57-82°F)

Frequently used in Chardonnay, Chenin blanc, Pinot gris, rosés, Albariño, Muscat, aromatic whites, fruit wines, cider CVW5[™] is a high producer of fruity aromas (esters) and a low producer of volatile acidity and SO_2 .

- Strong fermenter even under difficult conditions, including low turbidity, low temperatures, and low YAN
- Saccharomyces cerevisiae bayanus strain
- Selected from the Lallemand Oenology yeast strain collection and is a daughter strain of LALVIN EC1118™ (pg 26)
- Must be stored at 39-52°F (4-11°C)

500g - Item #15237*

10 kg - Item #15210*

CY3079 (BOURGOBLANC)



Classic strain for barrel-fermented Burgundy whites

Alcohol Tolerance: 15%

Nitrogen Needs: HIGH
Temp. Range: 15-25°C (59-77°F)

Frequently used in Chardonnay, Pinot blanc

LALVIN CY3079 (Bourgoblanc) $^{\text{m}}$ is a highly complementary yeast for barrel-fermented and sur-lie aged white wines, especially those made in the classical white Burgundy style.

- Enhances aromas of fresh butter, almond, honey, flowers, and pineapple
- Autolyzes quickly at the end of fermentation resulting in round wines which are malolactic bacteria friendly
- Steady fermentation rate but can be slow towards finish. To mitigate, ensure GO-FERM PROTECT EVOLUTION™ or GO-FERM STEROL FLASH™ is used during rehydration and wine is mixed to keep yeast in suspension
- Saccharomyces cerevisiae cerevisiae strain
- Isolated by the Bureau Interprofessional des Vins de Bourgogne (BIVB), France

500 g - Item #15061*

10 kg - Item #15082*

DV10



Strong fermenter for crisp, clean wines

Alcohol Tolerance: 17%

Nitrogen Needs: LOW

Temp. Range: 10-35°C (50-95°F)

Frequently used in Chardonnay, sparkling fermentations, Gewürztraminer, Pinot gris, late harvest, Pinot blanc, fruit wines, cider LALVIN DV10™ is well known for its ability to conduct reliable, clean, and fast fermentations while respecting varietal character.

- Recognized for its low foaming, low VA, and very low H₂S and SO₂ production
- Saccharomyces cerevisiae bayanus strain
- · French isolate from an area renowned for making sparkling wine

500 g – Item #15062*

10 kg - Item #15106*

EC1118 (PRISE DE MOUSSE)



Original sparkling wine strain

Alcohol Tolerance: 18% Nitrogen Needs: LOW

Temp. Range: 10-30°C (50-86°F)

Frequently used in sparkling fermentations, late harvest, high °Brix grapes, cider

LALVIN EC1118™ is the original, robust, low-foaming yeast strain for sparkling wine fermentations and late-harvest wines.

- Good flocculation characteristics resulting in compact lees
- Under deficient nutrient conditions EC1118 can produce high amounts of SO₂ (up to 50 ppm) which may inhibit malolactic fermentation
- · Saccharomyces cerevisiae bayanus strain
- Selected by the Institut Oenologique de Champagne (IOC) in Epernay, Franc

500 g - Item #15053*

10 kg - Item #15076*

ELIXIR



Releases a wide range of varietal aromas for aromatically complex whites and rosés

Alcohol Tolerance: 15% Nitrogen Needs: MEDIUM

Frequently used in Sauvignon blanc, Chardonnay, Viognier, rosés, Rhône whites, aromatic whites, cider

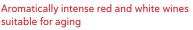
Temp. Range: 14-25°C (57-77°F)

VITILEVURE ELIXIR™ is excellent at releasing bound varietal aromas, resulting in well-balanced wines that are aromatically complex with a long finish.

- Wines show fruity and floral varietal aromas due to the release of bound terpenes and thiols and the production of stable esters
- Suitable for use in highly clarified juice, even at low temperatures
- Low SO₂, H₂S, and volatile acidity producer
- · Saccharomyces cerevisiae hybrid
- From the yeast hybridization program at the Institute for Wine Biotechnology at the University of Stellenbosch, South Africa

500 g - Item #15214*

EXOTICS MOSAIC



Alcohol Tolerance: 15.5% Nitrogen Needs: MEDIUM

Temp. Range: 18-28°C (64-83°F)

Frequently used in Chardonnay, Viognier, Chenin blanc, Syrah, Merlot, Tempranillo, Grenache, cider

EXOTICS MOSAIC is an all-purpose strain that is equally suited to red and white wines and is successful in tank or barrel fermentations. Wines are aromatically intense but may take time to mature, making this strain suitable for wines destined for aging.

- · White wines sport guava, passion fruit, tropical and stone fruit aromas and flavors and good mouthfeel
- · Red wines are full-bodied, well-balanced, complex, and intense with cherry, floral, cocoa, and strawberry aromas
- Do not inoculate into cold juice or must as this strain is not cold tolerant
- · Can partially degrade malic acid
- · Saccharomyces cerevisiae and S. paradoxus hybrid
- Developed at the Institute for Wine Biotechnology at the University of Stellenbosch, South Africa
- Must be stored at 5-15°C (41-59°F)

250 g - Item #15213*

5 kg - Item #15220*

EXOTICS NOVELLO

Versatile strain for fruity, early-to-market wines with soft, round mouthfeel

> **Alcohol Tolerance: 15.5%** Nitrogen Needs: MEDIUM

Temp. Range: 17-27°C (62-82°F)

Frequently used in Sauvignon blanc, Viognier, aromatic whites, Merlot, Syrah, fruit-forward reds

EXOTICS NOVELLO is known for enhancing mouthfeel, softness, and aromas in white and red wines.

- · In white wines, fresh, fruity thiols and floral esters are revealed while astringency and bitterness are decreased
- In red wines, red and black fruits and spice are increased while green and vegetal characters are diminished
- Low VA and H_oS producer and has some pectinase activity
- Saccharomyces cerevisiae and S. cariocanus hybrid
- Developed by Anchor Oenology in collaboration with the Australian Wine Research Institute (AWRI)
- Must be stored at 5-15°C (41-59°F)

in Sauvignon blanc 4300 ethyl esters thiols 2475 2400 1350 780 Commercial Commercial **Exotics**

Exotics Novello Impact on Esters & Thiols

250g - Item #15271*

FERMIVIN CHAMPION

OENOBRANDS

Fructophilic yeast for restarting stuck ferments

Alcohol Tolerance: 18%

Nitrogen Needs: MEDIUM

Temp. Range: 15-30°C (59-86°F)

Frequently used in restarting stuck fermentations

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.

- Can be added as a preventative measure towards the end of high (initial) Brix fermentations with no pre-acclimatization if the ethanol is <10%
- Saccharomyces cerevisiae bayanus strain
- Selected in Alsace by the National Research Institute for Agriculture, Food and the Environment (INRAe) of Narbonne, France

500 g - Item #17143*

10 kg - Item #17145*

FERMIVIN MT48



Fruit-forward and approachable reds

Alcohol Tolerance: 15%
Nitrogen Needs: LOW
Temp. Range: 20-30°C (68-86°F)

Frequently used in Merlot, Sangiovese, Grenache, Tempranillo, Syrah, fruit-forward reds FERMIVIN® MT48 helps to make round, aromatically expressive wines with soft tannins. It is best suited to wines that are bottled and consumed young.

- Enhances aromatic notes of cherry, raspberry, blackberry, plum, and spices
- Low VA and acetaldehyde production under non-stressful fermentation conditions
- Saccharomyces cerevisiae cerevisiae strain
- Selected in Bordeaux by the Institut Français de la Vigne et du Vin (IFV) France in collaboration with the Conseil Interprofessionel du Vin de Bordeaux (CIVB)

500 g - Item #17106*

FERMIVIN SM102



Sweet and semi-sweet wine production

Alcohol Tolerance: 12%

Nitrogen Needs: MEDIUM

Temp. Range: 16-22°C (61-72°F)

Frequently used in sweet white and rosé wines

FERMIVIN® SM102 produces delicate, aromatic wines. Fermentation can be easily arrested making this strain ideal for sweet and semi-sweet wine production.

- Produces delicate floral aromas and flavors while respecting varietal characteristics
- Easily stopped by alcohol levels beyond 12% or with chilling to <13 $^{\circ}\text{C}$ (55 $^{\circ}\text{F})$
- Saccharomyces cerevisiae cerevisiae strain
- Isolated from the Cognac region, France

500g - Item #17140*

ICV D21



Freshness and mouthfeel for mature and concentrated reds and whites

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 16-30°C (61-86°F)

Frequently used in Chardonnay, Rhône whites, rosés, Merlot, Syrah, Nebbio-lo, Zinfandel, Cabernet Sauvignon, structured reds, cider

LALVIN ICV D21[™] is a flexible strain that can be used to produce reds or whites with stable and long-lived aromas, higher perception of acidity, and a well-balanced mouthfeel. Equally suited for use in barrels or tanks.

- Ripe white grapes develop fresh citrus aromas.
- Red wines are noted for berry, and red fruit aromas, stable color, intense foremouth volume, mid-palate tannin structure, and fresh aftertaste
- Good for use in under- or overripe fruit. D21 helps to mask herbaceous notes in under-ripe fruit and cooked, jammy aromas in over-ripe fruit bringing aromatic freshness and good mouthfeel
- Fast onset of fermentation, easy to use strain, but can produce VA if stressed
- Saccharomyces cerevisiae cerevisiae strain
- Isolated from Languedoc by the Institut Coopératif du Vins (ICV), France

500 g - Item #15143*

10 kg - Item #15163*

ICV D47



Aromatic and well-balanced barrel- or tank-fermented wines

Alcohol Tolerance: 15% Nitrogen Needs: LOW Temp. Range: 16-27°C (60-82°F)

Frequently used in Chardonnay, rosés, Rhône whites, Riesling, cider LALVIN ICV D47™ is a high polysaccharide and ester producing strain suitable for both tank and barrel-fermented white and rosé wines.

- Produces full-bodied, complex wines with citrus, stone fruit, tropical fruit, and floral aromas
- Stir and increase temperature to 17-20°C (63-68°F) at end of fermentation for a cleaner finish
- Suitable for lees aging, where spicy notes can develop
- Saccharomyces cerevisiae cerevisiae strain
- Isolated from Suze-la-Rousse in the Côtes du Rhône region of France

500 g - Item #15642*

10 kg - Item #15643*

ICV_{D80}



Enhances tannin structure in big reds

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 15-27°C (59-82°F)

Frequently used in Cabernet Sauvignon, Grenache, Merlot, Syrah, Zinfandel, Petite Sirah, structured reds LALVIN ICV D80™ brings out varietal aromas, reinforces rich concentrated flavors, enhances tannin intensity, and helps stabilize color.

- Plum, spice, licorice, black pepper, and floral aromas are most often attributed to ICV D80
- Fast onset of fermentation and moderate ongoing fermentation speed
- Saccharomyces cerevisiae cerevisiae strain
- Isolated by the Institut Coopératif du Vin (ICV) in 1992 from the Côte Rôtie area of the Rhône Valley, France

500 g - Item #15125*

10 kg - Item #15133*

ICV D254



Mouthfeel, roundness, and balance in reds and whites

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 12-27°C (54-82°F)

Frequently used in Cabernet Sauvignon, Syrah, Zinfandel, Sangiovese, Chardonnay, Petit Verdot, Malbec, Rhône whites Wines fermented with LALVIN ICV D254 $^{\text{TM}}$ are described as having high foremouth volume, full mid-palate, and finish with intense fruit concentration.

- White wines can have stone fruit, mild spice, butterscotch, or hazelnut and almond aromas with good volume
- Red wines display ripe berry, plum, and mild spicy aromas with big mouthfeel and stable color
- · Temperature management is critical
- Saccharomyces cerevisiae cerevisiae strain
- Isolated by the Institut Coopératif du Vin (ICV) from a Rhône Valley Syrah fermentation

500 g - Item #15094*

10 kg - Item #15021*

ICV GRE



Fruit-forward, early-to-market reds and whites

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

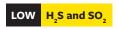
Temp. Range: 15-27°C (59-82°F)

Frequently used in Chenin blanc, Riesling, rosés, Rhône whites, Rhône reds, fruit-forward reds LALVIN ICV GRE $^{\text{\tiny{TM}}}$ is suited to early released wines where upfront fruit expression and good mouthfeel are desired.

- White wines can have melon, apricot, citrus, and tropical fruit aromas with a rich mouthfeel
- Red wines display berry, spicy and floral aromas
- · Reduced vegetal and undesirable sulfur off-odors
- Rapid onset of fermentation, low production of SO₂, volatile acidity, and foam
- Saccharomyces cerevisiae cerevisiae strain
- Selected by the Institut Coopératif du Vin (ICV) in 1992 from the Cornas area of the Rhône Valley, France

500 g - Item #15101*

10 kg - Item #15142*



ICV OKAY



Strong fermenter and fruity ester production

Alcohol Tolerance: 16%
Nitrogen Needs: LOW

Temp. Range: 12-30°C (54-86°F)

Frequently used in Petite Sirah, Grenache, rosés, Syrah, Viognier, cider

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

- Very short lag phase, steady fermentation kinetics, and good fermentation security
- No to very low SO₂, H₂S, and acetaldehyde production
- S. cerevisiae cerevisiae hybrid
- Selected in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), SupAgro Montpellier, the Institut Coopératif du Vin (ICV), and Lallemand Oenology

500 g - Item #15221*

10 kg - Item #15222*







Enhanced varietal character in whites and rosés

Alcohol Tolerance: 14%
Nitrogen Needs: LOW

Temp. Range: 15-30°C (59-86°F)

Frequently used in Chardonnay, Sauvignon blanc, rosés, Rhône whites, cider LALVIN ICV OPALE 2.0™ respects varietal characteristics while producing intense and complex fruit aromas in white and rosé wines with a well-balanced mouthfeel.

- White wines are fresh with notes of citrus, tropical fruit, and white flowers
- Rosé wines can display tropical or fresh red fruit character
- On the palate wines have an initial impression of volume and softness, followed by a round mid-palate and balanced finish
- No to very low SO₂, H₂S, and acetaldehyde production, fast onset of fermentation followed by steady rate
- S. cerevisiae cerevisiae hybrid
- Selected in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), SupAgro Montpellier, the Institut Coopératif du Vin (ICV), and Lallemand Oenology

500 g - Item #15065*

ICV SUNROSE



Complex and elegant rosé wines

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 14-20°C (57-68°F)

Frequently used in rosés from warm climates

LALVIN ICV SUNROSE™ is recommended for modern-style rosé wines that are red fruit and blackcurrant focused.

- Elegant and complex wines with a balanced, round mouthfeel and preserved freshness
- Excellent implantation rates and low volatile acidity production even in high Brix grapes
- Saccharomyces cerevisiae cerevisiae strain
- Selected in collaboration with the Institut Coopératif du Vin (ICV), France

500 g - Item #15280*

LOW H₂S and SO₂

IOC BE FRUITS



Fruity ester production for cold-fermented whites and rosés

Alcohol Tolerance: 14%

Nitrogen Needs: LOW
Temp. Range: 12-23°C (54-75°F)

Frequently used in Albariño, aromatic whites, rosés, cider

IOC BE FRUITS $^{\text{TM}}$ produces fruity esters (strawberry, pineapple, citrus notes) in white and rosé wines without masking varietal aromas.

- No to very low SO₂, H₂S, and acetaldehyde production
- Optimal conditions for fruity ester production are achieved when juice is clarified (80 NTU \pm 20) and fermentation temperatures are between 12–15°C (54–59°F)
- Fast onset of fermentation followed by a relatively fast fermentation rate and low volatile acidity production
- Saccharomyces cerevisiae cerevisiae strain
- Selected by the National Research Institute for Agriculture, Food and the Environment (INRAe), France

500 g - Item #15241*

LOW H₂S and SO₂

IOC BE THIOLS



Enhances varietal character (thiols) in aromatic whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 15-25°C (59-77°F)

Frequently used in Sauvignon blanc, Chenin blanc, Riesling, Gewürztraminer, rosés IOC BE THIOLS $^{\text{m}}$ reveals fruity thiols (citrus and exotic fruits) in white and rosé wines.

- Enhances grapefruit and passion fruit (3MH) aromas without excessive grassy characters
- No to very low ${\rm SO_{2'}}$ ${\rm H_2S}$, and a cetaldehyde production which heightens fruity expression
- Optimal conditions are: turbidity of 60–100 NTU, pH >3.2, fermentation temperatures of 15–20°C (59–68°F)
- · Fast fermenter with a short lag phase
- Saccharomyces cerevisiae cerevisiae strain
- Selected by the National Research Institute for Agriculture, Food and the Environment (INRAe), France

500 g - Item #15247*

IONYSWF



Acid production and mouthfeel enhancement for warm climate reds

Alcohol Tolerance: 16%

Nitrogen Needs: VERY HIGH

Temp. Range: 25-27°C (77-82°F)

Frequently used in reds from warmer climates with high pH and high potential alcohol

IONYS_{WF}TM can naturally increase the acidity of wines. When fermentation conditions are controlled, the acidification 'power' of IONYS_{WF} can result in a titratable acidity increase of 0.4-1.4 g/L and a pH decrease between 0.04-0.2.

- Wines are characterized as having fresh fruit and mineral characters with fine-grain tannins
- Total SO₂ prior to inoculation should not exceed 40 ppm
- Very high nitrogen requirements (1.4 ppm nitrogen is required per 1 g/L glucose and fructose to be fermented), when nitrogen is adequate fermentation speed is moderate with a long, but steady stationary phase
- Maintaining a temperature range of $25-28^{\circ}\text{C}$ (77-82°F) to optimize glycerol production (up to 15 g/L) and potentially decrease alcohol production by 0.4-0.8% (v/v)

 Acidifying Effects of IONYS_{we}
- Saccharomyces cerevisiae cerevisiae strain
- Selected in collaboration with the National Research Institute for Agriculture, Food and the Environment (IN-RAe), France
- Must be stored at 4-11°C (39-52°F)

500 g - Item #15233*

Control IONYS WF 9.3 7.5 6.4 Syrah Merlot Syrah Tempranillo 2013 2013 2014 2014

K1 (V1116)

LALLEMAND

Strong fermenter for high ester production under challenging conditions

Alcohol Tolerance: 18%

Nitrogen Needs: LOW

Temp. Range: 10-35°C (50-95°F)

Frequently used in aromatic whites, Chenin blanc, cider LALVIN K1 (V1116)™ is one of the highest ester producing strains in our portfolio.

- Strong floral ester producer, well-suited to juices lacking aromatic complexity/ interest (as can be the case with some high-yielding vineyards)
- Performs well under difficult conditions such as extreme temperatures, high alcohol (18% v/v), and low turbidity
- Saccharomyces cerevisiae cerevisiae strain
- Selected by the Institut Coopératif du Vin (ICV), France

500 g - Item #15063*

10 kg - Item #15077*

MSB



Isolate from Marlborough for zesty, tropical Sauvignon blancs

Alcohol Tolerance: 14.5%

Nitrogen Needs: MEDIUM

Temp. Range: 14-20°C (57-68°F)

Frequently used in Sauvignon blanc, Colombard, Chenin blanc

LALVIN MSB^{m} enhances fruity, tropical, and citrus notes while maintaining a balanced mouthfeel.

- Freshness maintained due to minimal malic acid uptake
- Moderate rate fermenter, low H₂S and SO₂ producer
- Saccharomyces cerevisiae bayanus strain
- Isolated from the Marlborough Valley in New Zealand by the Lallemand Oenology R&D team

500 g - Item #15267*

MT



Produces long-aging Bordeaux-style wines from high maturity grapes

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 15-32°C (59-90°F)

Frequently used in Merlot, Cabernet Sauvignon, Petit Verdot, structured reds VITILEVURE MT[™] is known for producing wine aromas of strawberry and caramel, especially in Merlot, and is recommended for grapes with high maturity and long aging potential.

- Wines have good color intensity and tannin structure
- Displays steady fermentation kinetics and produces minimal volatile acidity and H_oS when good fermentation practices are followed
- Saccharomyces cerevisiae cerevisiae strain
- Selected in Saint-Émilion, France, by the Institut Français de la Vigne et du Vin (IFV) Bordeaux in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), France

500 g - Item #15650*

10 kg - Item #15651*

NEW <

NBC



Burgundy selection for modern and fresh aromatic whites and rosés

Alcohol tolerance: 15%

Nitrogen needs: MED-HIGH

Temp. Range: 14-20°C (57-68°F)

Frequently used in Chardonnay, Chenin blanc, Pinot gris, Chardonnel, Rhône style whites, aromatic whites, rosés LALVIN NBC™ was selected for making fresh and refined Chablis-style Chardonnay with enhanced floral, citrus and mineral notes, but is also well-suited for making rosés and Rhône style whites.

- Wines are described as elegant and well-balanced with fresh fruit aromas and preserved acidity
- Suitable for barrel fermentations and has excellent compatibility with malolactic bacteria
- Has a short lag phase, low production of SO₂, and acetaldehyde
- Saccharomyces cerevisiae cerevisiae
- Isolated from a Chardonnay fermentation by the Centre Oenologique de Bourgogne (COEB), France

500 g - Item #15656*

NT 116



All-purpose strain for New World style whites and reds

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 12-28°C (54-83°F)

Frequently used in Syrah, Cabernet Sauvignon, Merlot, Petite Sirah, Pinot gris, aromatic whites, full-bodied and high maturity red wines destined for oak aging, cider NT 116 is equally suited for white and red winemaking. It releases varietal aromas and produces esters but delivers different results in reds and whites.

- White wines are fresh, tropical, and zesty
- · Red wines are red and black fruit-focused and are well-suited for oak aging
- · Releases polysaccharides, decreasing the sensation of astringency and bitterness
- Very strong fermenter temperature control is advised when using this low foaming but vigorous strain
- Saccharomyces cerevisiae hybrid
- Product of the yeast hybridization program of Infruitec-Nietvoorbij, the wine and vine institute of the Agricultural Research Council in Stellenbosch, South Africa

1 kg – Item #15185*

10 kg - Item #15226*

NT 202

Structured and complex reds

Alcohol Tolerance: 16% Nitrogen Needs: MEDIUM

Temp. Range: 18-27°C (64-82°F)

Frequently used in Cabernet Sauvignon, Pinot noir, Merlot, Malbec, structured reds

NT 202 is an aromatic red wine yeast that promotes rich fruit flavors, especially in ripe grapes.

- Commonly produced aromas include blackberry, blackcurrant, tobacco, and plum
- · Can help mask herbaceousnessn and integrate mouthfeel decreasing the perception of aggressive tannins and heat from high alcohol
- Fermentation temperature must be controlled in this low foaming strain
- · Saccharomyces cerevisiae hybrid
- Product of the yeast hybridization program of Infruitec-Nietvoorbij, the wine and vine institute of the Agricultural Research Council in Stellenbosch, South Africa

1 kg - Item #15191*

10 kg - Item #15227*

LOW

H_sS and SO_s

PERSY



Varietal expression and mouthfeel in fruit-forward red wines

Alcohol Tolerance: 16% Nitrogen Needs: LOW

Temp. Range: 15-27°C (59-82°F)

Frequently used in Rhône reds, Pinot noir, Tempranillo, or other red varietals susceptible to H₂S production

Red wines fermented with LALVIN PERSY™ have persistent fruit-forward aromas and flavors optimizing varietal character.

- · Wines have red fruity aromas, spicy notes, a balanced mouthfeel with good entry and midpalate and integrated tannins
- No to very low SO₂, H₂S, and acetaldehyde production which further enhances fruit expression
- · Saccharomyces cerevisiae hybrid
- Developed in collaboration with National Agricultural Research Institute (INRA), SupAgro Montpellier, and Lallemand Oenology.

500 g - Item #15261*

10 kg - Item #15262*

QA23



Strong fermenter for varietal expression in highly clarified white juice

> **Alcohol Tolerance: 16%** Nitrogen Needs: LOW

Temp. Range: 15-32°C (59-90°F)

Frequently used in Chardonnay, Sauvignon blanc, Gewürztraminer, Pinot blanc, Albariño, Muscat, aromatic whites, cider

LALVIN QA23™ is excellent at revealing varietal aromas (thiols and terpenes). This quality makes it a particularly good yeast for developing varietal Sauvignon blanc passion fruit character and citrus aromas.

- Aromas of tropical, citrus, and white fruit are commonly used to described QA23 fermented wines
- Produces a large amount of the enzyme β -glucosidase, allowing for the release of bound terpenes responsible for floral and spicy notes
- · Low nutrient and oxygen requirements and can ferment juice with low turbidity at low temperatures to dryness
- Saccharomyces cerevisiae bayanus strain
- Selected in Portugal by the University of Trásos-Montes and Alto Douro (UTAD) in cooperation with the Viticultural Commission of the Vinho Verde region

500 g - Item #15652*

10 kg - Item #15653*

R2



Expression of varietal aromas at cold temperatures

Alcohol Tolerance: 16% Nitrogen Needs: MEDIUM **Temp. Range:** 10-30°C (50-86°F)

Frequently used in Riesling, Sauvignon blanc, Gewürztraminer, late harvest,

aromatic whites, cider

LALVIN R2™ can enhance varietal characters due to the enzymatic release of aroma precursors, producing intensely aromatic fruit and floral-driven white wines.

- Wines produced have mineral notes and spicy, floral, and tropical aromas
- Excellent cold temperature properties and has been known to ferment in conditions as low as 41°F (5°C)
- Tends to produce VA without proper nutrition or when stressed
- · Saccharomyces cerevisiae bayanus strain
- Isolated in the Sauternes region of Bordeaux, France

500 g - Item #15071*

RC212 (BOURGOROUGE)

Enhanced structure and color in Pinot noir

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 16-30°C (60-86°F)

Frequently used in Pinot noir, Grenache. Cabernet Franc

LALVIN RC 212 (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.

- Protects color due to low absorbance rates onto yeast cell walls
- Requires thoughtful nutrient additions to avoid potential hydrogen sulfide production
- Saccharomyces cerevisiae cerevisiae strain
- Selected in Burgundy, France, by the Bureau Interprofessional des Vins de Bourgogne (BIVB)

500 g - Item #15057*

10 kg - 15097*

RHÔNE 2226



Complexity and balance in high alcohol reds

Alcohol Tolerance: 18%

Nitrogen Needs: HIGH

Temp. Range: 15-27°C (59-82°F)

Frequently used in Merlot, Zinfandel, Sangiovese, Barbera, Cabernet Franc, Petite Sirah, structured reds Wines made using LALVIN RHÔNE 2226™ have intense color and aromas of black cherry, berries, and cherry cola.

- Contributes to wine quality by enhancing varietal characters and tannin structure in red wines from warm and hot climate fruit
- Has a short lag phase, high fermentation vigor, and tolerates high alcohol levels
- Saccharomyces cerevisiae cerevisiae strain
- Isolated from a vineyard in the Côtes du Rhône region of France

500 g - 15644*

10 kg - Item #15645*

RHÔNE 4600



Aromatic and elegant whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 13-22°C (56-72°F)

Frequently used in rosés, Viognier, Chardonnay, Rhône whites, cider LALVIN RHÔNE 4600™ produces wines with complex aromatic notes and good volume.

- Noted for elevating fresh fruit aromas (apple, pear, strawberry) in rosé and Rhône-style whites
- Can notably produce apricot and tropical fruit flavors even when fermented at cool temperatures (13.5°C (56°F))
- May produce volatile acidity and SO₂ under stressful conditions
- Saccharomyces cerevisiae cerevisiae strain
- Isolated from a Viognier fermentation in the Côtes du Rhône region of France in collaboration with Inter-Rhône's technical department

500 g - Item #15171*

R-HST



Strong fermenter for Riesling and other aromatic whites

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 10-30°C (50-86°F)

Frequently used in Riesling, Gewürztraminer, Sauvignon blanc, Viognier, Rhône whites, aromatic whites, cider LALVIN R-HST™ retains fresh varietal character while contributing structure and mouthfeel.

- It can produce crisp, premium white wines with citrus and floral notes
- Short lag phase which allows R-HST to dominate over spoilage yeast in juice
- Tolerates temperatures as low as 10°C (50°F), although temperature should be increased toward the end of fermentation for a clean finish
- Saccharomyces cerevisiae cerevisiae strain
- · Selected from Riesling trials conducted in the Heiligenstein region, Austria

500 g - Item #15130*

RP15



Complex, balanced, and concentrated reds

Alcohol Tolerance: 17%
Nitrogen Needs: MEDIUM

Temp. Range: 20-30°C (68-86°F)

Frequently used in Syrah, Zinfandel, Merlot, Cabernet Sauvignon, Cabernet Franc, Petite Sirah, Malbec, Petit Verdot, Tempranillo, structured reds ENOFERM RP15™ is recommended for medium to full-bodied red wines to produce a rich, lush, and balanced mouthfeel.

- Wines are characterized by red fruit, berry, spicy, mineral notes with a rich mid-palate structure
- Wines have good color and ageable tannins
- · Saccharomyces cerevisiae cerevisiae strain
- This strain was isolated from spontaneous Rockpile Syrah fermentations in California

500 g - Item #15665*

10 kg - Item #15666*

SAUVY



For mega expression of grassy thiols

Alcohol Tolerance: 14%

Nitrogen Needs: MEDIUM

Temp. Range: 14-20°C (57-68°F)

Frequently used in Sauvignon blanc, Chenin blanc, Pinot gris, Riesling, rosés SAUVY™ was selected to help winemakers make New Zealand style Sauvignon blanc, but it does equally well in expressing thiols of other varietals.

- In cooler growing regions, SAUVY may express more 4MMP, a grassy thiol precursor, and using SAUVY may result an intensely grassy wine
- In warmer growing regions, SAUVY may produce wines that still express the box wood/gooseberry character but are more balanced, crisp, and refreshing
 Impact of SAUVY™ on Volatile Thiols in
- SAUVY can help increase the aromatic expression of less expressive grapes
- SAUVY produces very low to no H₂S, SO₂ and volatile acidity
- Saccharomyces cerevisiae cerevisiae strain

2019 Napa Valley Sauvignon blanc

3MH (ng/L) 3MHA (ng/L) 4MMP (ng/L)

249 46 97

2 4 6.3

QA23 Sauvy QA23 Sauvy QA23 Sauvy

500 g - Item #15258*

10 kg - Item #15272*

LOW H,S and SO,

SENSY



Varietal aroma production under difficult conditions for whites and rosés

Alcohol Tolerance: 15%
Nitrogen Needs: LOW
Temp. Range: 12-17°C (54-64°F)

Frequently used in rosés, Chardonnay, Sauvignon blanc, Pinot blanc, cider LALVIN SENSYTM respects varietal aromas and promotes aromatic esters while producing no to very low levels of H_2S even under low temperature and highly-clarified white winemaking conditions.

- SENSY has a very short lag phase
- Total SO, prior to inoculation should not exceed 50 ppm
- Saccharomyces cerevisiae hybrid
- Selected in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), SupAgro Montpellier, Institut Coopératif du Vin (ICV), and Lallemand Oenology

500 g - Item #15225*

SYRAH



Spicy, fruity, and floral reds

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 15-32°C (59-90°F)

Frequently used in Syrah, Grenache, Sangiovese, Merlot, Mourvedre, Petite Sirah, structured reds ENOFERM SYRAH $^{\text{\tiny TM}}$ offers good mouth feel, stable color extraction, and enhances varietal aromas.

- Typical aromas include berry (strawberry and raspberry), plum, violet, spice, licorice, and black pepper depending on the varietal
- Fermentations start quickly, have a moderate ongoing fermentation speed, and low VA production
- Can produce H₂S under low YAN conditions, hence rehydration with GO-FERM PROTECT EVOLUTION™ or GO-FERM STEROL FLASH™ and nutrition management is essential
- Saccharomyces cerevisiae cerevisiae strain
- · Isolated from the Côtes du Rhône region, France

500 g - Item #15657*

10 kg - Item #15658*

T73

LALLEMAND

Strong fermenter for varietal complexity in hot climate reds

Alcohol Tolerance: 16%
Nitrogen Needs: LOW

Temp. Range: 18-32°C (65-90°F)

Frequently used in Merlot, Zinfandel, Sangiovese, Tempranillo, fruit-forward reds LALVIN T73™ is recognized for its production of stable fruit aromas and flavors and integration of alcohol in red wines from hot climates.

- Notable aromas include ripe berries and plums
- Shows good resistance to anti-fungal vineyard treatments, has extremely low nitrogen demand and dominates against indigenous microflora
- Saccharomyces cerevisiae bayanus strain
- Isolated by La Universidad de Valencia of Spain in collaboration with Lallemand Oenology

500 g - Item #15091*

TANGO



Balanced reds with perception of sweetness

Alcohol Tolerance: 15.5%

Nitrogen Needs: MEDIUM

Temp. Range: 15-27°C (59-82°F)

Frequently used in Malbec, Syrah, Tempranillo, Merlot, Petite Sirah LALVIN TANGO™ respects varietal characteristics producing full-bodied red wines with intense color, good structure, balance, and a juicy finish.

- Aromas and flavors of violet, black cherry, blackberry, raspberry, dark plum, and anise are common
- Low H₂S and SO₂ producer, short lag phase and moderate fermentation speed
- Saccharomyces cerevisiae cerevisiae strain
- Isolated by the National Institute of Agricultural Technology (INTA) in La Consulta, Uco Valley, Mendoza, Argentina

500 g - Item #15252*

VIN 13



Robust and easy-to-use strain with good varietal aroma expression

Alcohol Tolerance: 17%

Nitrogen Needs: LOW

Temp. Range: 12-16°C (54-61°F)

Frequently used in Sauvignon blanc, Chenin blanc, Chardonnay, rosés, Gewürztraminer, Muscat, Albariño, aromatic whites, cider VIN 13 is appreciated for producing aromatic white and rosé wines that are varietally respectful but intensely fruity due to the release of thiols and the production of esters.

- Aromas are linked to both thiols (passion fruit, guava, gooseberry, and grapefruit), and esters (pineapple, banana, and floral)
- Favored for its ease of use and robustness, making this strain suitable for challenging winemaking conditions
- Temperature control is advised during fermentation
- · Saccharomyces cerevisiae hybrid
- Product of the yeast hybridization program at the Institute for Wine Biotechnology, University of Stellenbosch, South Africa

1 kg – Item #15183*

10 kg - Item #15228*

VIN 2000



Full-bodied aromatic whites

Alcohol Tolerance: 15.5%

Nitrogen Needs: LOW

Temp. Range: 13-16°C (55-61°F)

Frequently used in Chenin blanc, Chardonnay, Sauvignon blanc, Viognier, Albariño VIN 2000 produces rich and ripe aromatic white wines and is compatible with barrel fermentation.

- Aromas include citrus and tropical fruits (passion fruit, guava, and pineapple)
- Moderate speed fermenter with very low SO₂ production and low foaming
- Saccharomyces cerevisiae hybrid
- · Temperature control is advised
- Product of the yeast hybridization program at the Institute for Wine Biotechnology, University of Stellenbosch, South Africa

1 kg - Item #15195*

VRB



Balance and mouthfeel in high alcohol reds

Alcohol Tolerance: 17%

Nitrogen Needs: MEDIUM

Temp. Range: 15-27°C (59-82°F)

Frequently used in Cabernet Franc, Tempranillo, Barbera, Sangiovese, Zinfandel, Petite Sirah, fruit-forward reds, Nebbiolo, hybrids Wines made using UVAFERM VRB™ are described as having stable color, round mouthfeel, and good structure, especially through the mid-palate. They also display aromas that complement varietal characteristics.

- Wines are described as having flavors of ripe fruit, berry, jam, hazelnut, and dried plums
- Can partially metabolize malic acid, softening high malic acid musts
- Fast implantation rate, short-medium lag phase, and good fermentation rate with low VA production
- Saccharomyces cerevisiae cerevisiae strain
- Selected by Centro de Investigaciones Agrarias (CIDA) in Logroño, Spain
 500 g Item #15173*

W15

Clean fermenter at low temperatures

Alcohol Tolerance: 16%
Nitrogen Needs: HIGH
Temp. Range: 10-27°C (50-81°F)

Frequently used in Gewürztraminer, Riesling, Pinot gris, Pinot noir, Syrah, rosés, aromatic whites, late harvest, cider LALVIN W15 $^{\text{m}}$ helps retain bright fruit characters, optimizing mid-palate and balance due to high levels of glycerol and succinic acid. This strain is tolerant of high levels of sugar, making it an ideal choice for late harvest and ice wines.

- White wines display spicy, floral, and citrus aromas and mouthfeel is well-balanced
- · Red wines display bright fruit aromas and good structure
- Low heat generation during fermentation helps winemakers minimize the potential for temperature spikes and possible hydrogen sulfide production
- Saccharomyces cerevisiae cerevisiae strain
- Isolated from a Müller-Thurgau fermentation in 1991 at the Swiss Federal Research Station in Wädenswil, Switzerland

500 g - Item #15118*

10 kg - Item #15119*

PROTOCOL

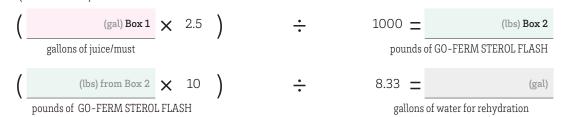
YEAST REHYDRATION WITH GO-FERM STEROL FLASH™

NEW <

GO-FERM STEROL FLASH™ was specifically developed to eliminate the need for warm water rehydration and acclimatization steps. This protocol is only for use with GO-FERM STEROL FLASH. If using a different GO-FERM rehydration nutrient, please see the protocol the next page.

PREPARE REHYDRATION NUTRIENT:

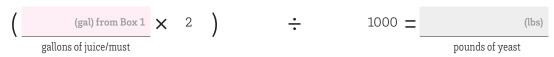
1. Suspend 30 g/hL (2.5 lb/1000 gal) of GO-FERM STEROL FLASH in 10 times its weight of clean, chlorine-free, water $(>15^{\circ}\text{C}/59^{\circ}\text{F})$.





REHYDRATE YEAST:

2. Add 25 g/hL (2 lb/1000 gal) of active dried yeast.



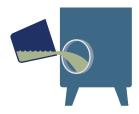


3. Stir gently to break up any clumps and let suspension stand for 15 minutes. Foaming is not an indicator of yeast viability. Do not let yeast stand in rehydration water longer than 30 minutes without inoculating or yeast viability will decline.

INOCULATE:

4. Add yeast slurry from step 3 directly into juice or must and mix.

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 allows the yeast a head start over indigenous organisms.



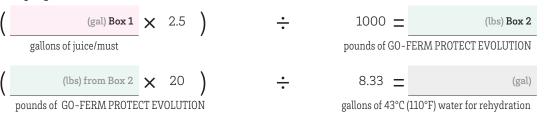
PROTOCOL YEAST REHYDRATION WITH GO-FERM™ & GO-FERM PROTECT EVOLUTION™

Note: This protocol is not appropriate for non-Saccharomyces yeast. To rehydrate non-Saccharomyces yeast, please review the non-Saccharomyces rehydration protocol.

PREPARE REHYDRATION NUTRIENT

Pro Tip: do this step in a vessel that can accommodate up to 4 times the volume of the rehydrated yeast.

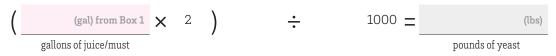
1. Suspend 30 g/hL (2.5 lb/1000 gal) of GO-FERM™ or GO-FERM PROTECT EVOLUTION™ in 20 times its weight of clean, chlorine-free, 43°C (110°F) water. Please note that these rehydration nutrients do not fully dissolve into solution, some clumping is normal.



If not using a rehydration nutrient, add yeast to a water volume that is 10x the weight of the yeast at 40° C (104° F). This lower temperature is important, so you do not harm the yeast.

REHYDRATE YEAST

- 2. Allow temperature of yeast rehydration nutrient solution from step 1 to drop to 40° C (104° F).
- 3. Add $25 \, g/hL (2 \, lb/1000 \, gal)$ of active dried yeast.



4. Stir gently to break up any clumps and let suspension stand for 20 minutes, then stir gently again. Foaming is not an indicator of yeast viability. Do not let yeast stand in rehydration water longer than 30 minutes without adding juice or must or yeast viability will decline.

ACCLIMATIZE

- 5. Slowly, over 5 minutes, add some juice or must to the yeast slurry to drop the temperature by 10° C (18° F). Let stand 15-20 minutes.
- 6. Repeat step 5 until the temperature difference between the yeast slurry and the juice or must is within 10°C (18°F). For example, if juice or must temperature is 20°C (68°F) and the yeast slurry temperature is 40°C (104°F), step 5 will need to be repeated twice.



INOCULATE

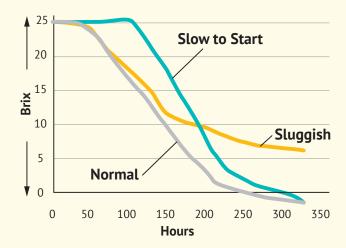
7. Add yeast slurry from step 6 directly into juice or must and mix.

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 allows the yeast a head start over indigenous organisms.



ARTICLE TROUBLESHOOTING GUIDE FOR PROBLEMATIC ALCOHOLIC FERMENTATIONS

Alcoholic fermentations may become problematic at several points. Sometimes they are slow to start, sometimes they become sluggish, and sometimes they become completely stuck.



IF FERMENTATION IS SLOW TO START:

When yeast is inoculated it undergoes a lag phase where yeast cells are adapting to their new environment. It might seem like nothing is happening (no sugar drop, no bubbles), but the yeast are likely still alive and preparing for growth and active fermentation. If fermentation is slow to start, several factors may be extending the lag phase:

THE JUICE MAY BE TOO COLD

Lag phase length is significantly influenced by temperature. To shorten it, ensure that the fermentation temperature is warm enough but within the suggested temperature range for the selected yeast.

THERE MAY BE A LACK OF NUTRIENTS

At the start of fermentation, yeast have a **high demand for vitamins and minerals** and a moderate demand for nitrogen. Grapes naturally contain some of these nutrients, but they may be deficient and/or quickly consumed by native microflora and supplementation is necessary.

Rehydration nutrients can supply vitamins and minerals, and fermentation nutrients added at inoculation can supply necessary nitrogen to get fermentation started. If proper pre-fermentation nutrient additions were not made or the juice/must was otherwise deficient, an addition of a fermentation nutrient (FERMAID $^{\text{\tiny TM}}$) can help invigorate fermentation.

THE JUICE/WINE MIGHT BE TOO CLEAR

If the juice is over-clarified (<50 NTU), **yeast may struggle to stay in suspension** during the early phases of fermentation. In this case, increase the turbidity by adding RESKUETM (pg 60) and stir the fermentation. It is also worth noting that proper use of rehydration nutrients (pgs 54-55) will increase the turbidity of the juice and may help avoid this problem.

THE YEAST MAY NOT HAVE BEEN ACCLIMATIZED

Rehydrated yeast must have time to acclimitize to juice or must conditions (temperature, pH, etc.). **Improper acclimatization** can shock the yeast, increasing the lag phase or killing the cells. In this case, a reinoculation might be necessary. To avoid this problem, use the "Saccharomyces Yeast Rehydration" protocol (pgs 36–37) which details proper steps for acclimatization.

THERE MAY NOT BE ENOUGH YEAST

If you did not inoculate or you did not inoculate at the recommended rate, it is possible that there is not a sufficient population of yeast. In this case, a reinoculation might be necessary.

IF FERMENTATION BECOMES SLUGGISH OR STUCK:

The most common fermentation problems are stuck and sluggish fermentations:

- A fermentation is considered stuck if the sugar has not dropped for >48 hours.
- A fermentation is sluggish and may become stuck if it is approaching ~1 °Brix and slows to <0.25 °Brix per day

Many times, stuck and sluggish fermentations will require a restart (see pg 40), but not always. Consider the following before conducting a restart:

THE TEMPERATURE MAY BE TOO HIGH OR TOO LOW

Each yeast strain has an optimal temperature range and anything outside of this range can cause yeast stress. 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 reinoculation will be necessary. If the temperature is too low, try slowly warming the wine.

To help avoid this problem, try adjusting the temperature of the wine to $20-22^{\circ}$ C (68-72°F), especially toward the end of fermentation.

THE ALCOHOL MAY BE TOO HIGH

Certain yeast strains can tolerate more alcohol than others. If you have exceeded the tolerance level of your selected strain, you may need to reinoculate with a strain that has a higher tolerance.

THE WINE MIGHT NEED A DETOXIFICATION

When wine **yeast become stressed**, they can produce compounds that impede fermentation. RESKUE $^{\text{TM}}$ (pg 60) can be extremely beneficial in this situation. Add RESKUE and mix thoroughly, then rack after 48 hours. If you are unable to rack, adding RESKUE and leaving it in the wine can still help.

THERE MIGHT BE UNWANTED MICROBIAL POPULATIONS

Lactic acid bacteria (LAB) can produce volatile acidity (VA) and inhibit yeast activity. Volatile acidity >0.6 g/L can be challenging for yeast (especially in high alcohol conditions), and VA >0.8 g/L can be inhibitory.

To control LAB, use DELVOZYME (pg 131) if malolactic fermentation (MLF) isn't complete but is desired, or BACTILESS™ (pg 132) if MLF is complete or not desired. In any condition, uncontrolled LAB should be controlled before trying to restart a stuck fermentation.

IF A RESTART IS NECESSARY:

If a restart is necessary, use the protocol on pg 40. Fermentations stuck when the sugar level is >3 °Brix and <11.5% (v/v) alcohol are relatively easy to restart if there are no other compounding factors. Fermentations with less sugar and more alcohol become increasingly difficult to restart.

PROTOCOL

RESTART A STUCK FERMENTATION USING UVAFERM 43 RESTART

PREPARE THE STUCK WINE:

These steps mitigate spoilage organisms and remove some toxic compounds commonly present in stuck wines. Toxic compounds are frequently produced by stressed yeast during a stuck ferment and can inhibit a restart if not removed.

Step 1*: Add SO₂ or a 25 g/hL addition of BACTI-LESS™ or lysozyme if spoilage bacteria is a concern.

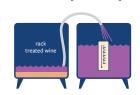
Step 2: Add RESKUE by suspending 40 g/hL (3.3 lb/1000 gal) RESKUE™ in 10 times its weight of warm water 30–37°C (86–98°F). Wait 20 minutes then add to stuck wine. Mix thoroughly to incorporate.



Step 3: Allow RESKUE to



settle for 48 hours.



PREPARE THE STARTER MIXTURE**:

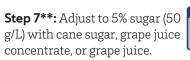
When adding yeast to a stuck wine environment with high alcohol and low sugar, yeast must be very carefully acclimatized so they can successfully complete fermentation. These steps prepare a wine mixture that is lower in alcohol and higher in sugar than the stuck wine, which will help slowly acclimate yeast.

Step 5:** Add a portion of the stuck wine and some water to a new vessel:



- Wine volume = 5% of the volume of the stuck wine (from step 4)
- Water volume = 4% of the volume of the stuck wine (from step 4)

Step 6: Add 8g/hL (0.66lb/1000 gal) of FERMAID O™ to the starter mixture prepared in step 5. Calculate this step based on the volume prepared in step 5, not total stuck wine volume.





YEAST REHYDRATION

These steps ensure maximum yeast viability. **Pro tip:** do this step in a vessel that can accommodate up to 4 times the volume of the rehydrated yeast.

Step 9: Add 53 g/hL (4.4 lbs/1000 gal) of GO-FERM PROTECT EVOLUTION™ to 20 times its weight of chlorine-free 43°C (110°F) water. Calculate the amount of GO-FERM PROTECT EVOLUTION needed based on the volume of stuck wine, not the starter mixture.

Step 10: Allow solution to cool to 40° C (104° F).

Step 11: Add 40 g/hL (3.3 lbs/1000 gals) of UVAFERM 43 RESTART™ yeast. Stir gently and let stand for 20 minutes, then stir gently again. Calculate the amount of yeast needed based on the volume of stuck wine, not the starter mixture.

FIRST ACCLIMATIZATION:

These steps start the acclimatization of yeast to the stuck wine conditions. **Pro tip:** start this process in the afternoon so that your mixture in Step 15 hits 0° Brix during normal working hours the next day.

Step 12: Add enough starter mixture (from step 8) to the rehydrated yeast (from step 11) to drop the temperature by 10°C (18°F). Let stand 15-20 minutes.





Step 14: Maintain temperature of 20–25°C (68–77°F).



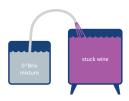
Step 15: Allow this mixture to drop to 0° Brix. This should take between 18 and 48 hours.



SECOND ACCLIMATIZATION/INOCULATION:

These steps continue the acclimatization of yeast and then inoculates the yeast into the stuck wine.

Step 16: Transfer the mixture from step 15 to the total volume of stuck wine (from step 4). Before



transferring, ensure the temperature of the two are within 10°C (18°F) of each other.

Step 17: Add 40 g/hL (3.3 lbs/1000 gal) of FERMAID 0. Mix to homogenize.



Step 18: Maintain temperature of 20–25°C (68–77°F) and monitor sugar depletion.



- ***Step 1:** Do not use BACTILESS in this step if malolactic fermentation hasn't completed but is desired.
- **Steps 5 and 7: We recommend adding water and sugar (in the form of cane sugar or grape juice concentrate) to maximize the success of restarting fermentations. However, there are state and federal regulations that address adding sugar and water during the winemaking process. Please check applicable regulations to ensure compliance.

WORKSHEET - USING UVAFERM 43 RESTART

Step 2 Calculate RESKUE addition and	total gallons of stuck wine	×	3.3)	÷	1000 =	(lbs) Box 1 pounds of RESKUE
water needed for re-suspension	(lbs) from Box 1	×	10)	÷	8.33 =	gallons of water
Step 4 Note the new volume after racking	gallons of stuck wine after racking						
Step 5 Calculate amount of stuck wine and water needed for starter mixture, then calculate total starter mixture volume	WINE (gal) from Box 2 gallons of stuck wine WATER		0.05	=	gallons of stuck wine for starter mixture		
	(gal) from Box 2		0.04	=	gallons of water for starter mixture	=	(gal) Box 3 gallons of starter mixture
Step 6 Calculate FERMAID 0 addition to starter	(gal) from Box 3 gallons of starter mixture	×	0.66)	÷	1000 =	pounds of FERMAID O
Step 9 Calculate amount of GO-FERM PROTECT EVOLUTION and amount	(gal) from Box 2	_	4.4)	÷	1000 =	pounds of GO-FERM PRO- TECT EVOLUTION
of water needed for yeast rehydration	pounds of GO-FERM PRO- TECT EVOLUTION	×	20)	÷	8.33 =	gallons of water
Step 11 Calculate amount of UVAFERM 43 RESTART needed for restart	(gal) from Box 2		3.3)	÷	1000 =	pounds of UVAFERM 43 RESTART
Step 17 Calculate FERMAID O addition to reinoculated fermentation.	(gal) from Box 2		3.3)	÷.	1000 =	pounds of FERMAID O

NON-SACCHAROMYCES YEAST

Yeast used in winemaking can be split into two categories; yeast that belong to the *Saccharomyces* genus and those that don't. Non-*Saccharomyces* (non-Sacc), although poor fermenters, have metabolic capabilities that make them useful winemaking tools. Depending on strain, non-*Saccharomyces* yeast can increase aroma, increase acidity, enhance mouthfeel, or offer antimicrobial and antioxidant protection.

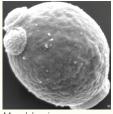
Non-Sacc yeast have not historically been selected and dried for winemaking applications. However, in the last decade, there's been an explosion of research on winemaking applications for non-Sacc yeast. These yeast are as varied in their applications and strain differences as their *Saccharomyces* cousins.

WHAT'S SO COOL ABOUT NON-SACC YEAST?

Non-Sacc yeasts have unique abilities that differ from Saccharomyces yeast. Saccharomyces yeast are reliable fermenters with the ability to impact wine aroma, flavor, and texture. Non-Sacc are not reliable fermenters because they are inhibited by alcohol. However, some non-Sacc yeast from the genera Metschnikowia, Lachancea, and Torulaspora can act in a variety of other ways which make them exciting tools for winemaking:









Metschnikowia pulcherrima

Lachancea thermotolerans M. pulcherri

Torulaspora delbrueckii

ANTIMICROBIAL

LEVEL² INITIA™ very quickly scavenges oxygen, allowing it to outcompete and suppress native spoilage organisms. GAIA™ suppresses spoilage organisms via a phenomenon called microbial crowding. By using INITIA in white or rosé juice or GAIA in red must, pre-fermentation VA production is limited.

ANTIOXIDATION

In addition to its oxygen scavenging abilities, LEVEL² INITIA™ also rapidly scavenges copper ions. Copper ions are an integral part of certain browning reactions and by eliminating copper, these reactions are blocked. This means that juice color is brighter (less brown) and aromas are protected (increased aromatic complexity and freshness).

ACIDIFICATION

LEVEL² LAKTIA™ can produce between 2-9 g/L lactic acid from glucose, which can lower pH and increase titratable acidity. LAKTIA is especially well-suited for wines that traditionally lack freshness, but it can be used in any variety to enhance complexity.

AROMA AND MOUTHFEEL ENHANCEMENT

LEVEL² FLAVIA™ can release bound varietal compounds (terpenes and thiols) and LEVEL² BIODIVA™ produces esters, leading to wines with more intense aromatic expression. These specific strains of non–Sacc can also increase mouthfeel roundness due to the release of mannoproteins (FLAVIA) and other mouthfeel components like arabinol (BIODIVA).

DID YOU KNOW?

THERE ARE SPECIAL CONSIDERATIONS WHEN USING NON-SACC YEAST

Timing of inoculation: Some non-Sacc yeast should be added to grapes, some to freshly pressed juice, and some directly to the fermentation vessel. Be sure to follow the recommendations for each strain.

Rehydration temperature: Non-Sacc yeast are rehydrated at a lower temperature than Saccharomyces (see pg 47).

 $\textbf{Optimal conditions for use:} \ \textbf{Each non-Sacc yeast strain operates best under certain temperature and free SO_2 conditions.}$

Tolerance to alcohol: Non-Sacc yeast cannot complete alcoholic fermentation because they are inhibited by alcohol. When using a non-Saccharomyces strain, subsequent inoculation with a Saccharomyces strain is required.

You may not need to use 25 g/hL: For some non-Sacc strains, dosage can be adapted based on certain winemaking conditions, such that you might not need 25 g/hL! See pg 45 for more information.

FRUIT & MEAD

QUICK GUIDE TO CHOOSING NON-SACCHAROMYCES YEAST

	BIODIVA™	FLAVIA™	GAIA™	INITIA™	LAKTIA™	
Organism	Torulaspora delbrueckii	Metschnikowia pulcherrima	Metschnikowia fructicola	Metschnikowia pulcherrima	Lachancea thermotolerans	
Main activity	Produces polysac- charides and aroma compounds (esters). Consumes some sugar to alleviate osmotic (high sugar) stress on Saccharomyces	parides and aroma proportion of the produces and aroma proportion of the produces and produces enzymes that cleave aroma precursors to reveal terpenes and thiols		Acts as a bioprotectant against VA-producing native microflora via microbial crowding Outcompetes VA-producing native microflora for oxygen thereby acting as a bioprotectant		
Winemaking application	Enhances mouthfeel, fruity esters and com- plexity of white, rosé and red wines. Suitable for late harvest, ice-wine, and high sugar musts where VA can be a challenge	Optimizes tropical, citrus, and floral notes of certain white and rosé wines	Protects red grapes against microbial spoil- age during transporta- tion or cold soak	Protects white and rosé juice from oxidative damage and microbial spoliage	Acidification (adds freshness and complexity)	
When to add Non-Saccharomyces	To the tank prior to alcoholic fermentation	To the tank prior to alcoholic fermentation	Directly to grapes (to protect during transport or cold soak)	To freshly pressed juice to protect during transportation or cold settling	To the tank prior to alcoholic fermentation	
When to add Saccharomyces	After 1.5-4 °Brix drop	24 hours after FLAVIA	Upon receipt, or end of cold soak	Once juice is racked to fermentation vessel	24-72 hours after LAKTIA	
Suggested compatible Saccharomyces strains	Any strain that meets your winemaking goal	Strains with ß-glycosidase activity (Denoted as strains that enhance varietal characters)	Any strain that meets your winemaking goal. 3001 is specifically recommended for use in Pinot noir musts that have undergone cold soak	Any strain that meets your winemaking goal	Any strain that meets your winemaking goal	

BIODIVA



Aromatically complex wines with roundness and volume

When to add BIODIVA:
Directly to fermentation vessel

When to add *Saccharomyces*: After 1.5-4 °Brix drop

Optimal conditions: Free SO₂: <15 ppm Temp: >15-22°C (59-71°F)

Frequently used in Chardonnay, Viognier, Chenin blanc, Merlot, Grenache, Syrah, Pinot noir, fruit-forward reds, late harvest, cider LEVEL² BIODIVA™ produces esters and releases varietal compounds that enhance fruitiness and produces compounds that increase mouthfeel volume and roundness.

- In red wines, red fruit aromas and overall aromatic intensity are enhanced.

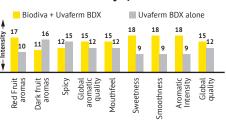
 Mouthfeel softness is also enhanced, and wines have a perception of sweetness
- White wines show fruity (tropical, white fruits), floral, and pastry notes
- Mildly fermentative and can tolerate approximately 6% alcohol
- Consumes glucose, alleviating osmotic stress on Saccharomyces in high sugar juices. This results in a cleaner fermentation with lower volatile acidity levels and potentially lower alcohol levels
- Osmotolerant, meaning that this yeast survives in high sugar environments making it an excellent choice for late-harvest juice and ice wines
- Torulaspora delbrueckii strain

Usage: See pg 47 for rehydration instructions. **Storage:** Store at 20°C (68°F). Once opened use immediately.

Recommended Dosage						
250ppm	25 g/hL	2 lbs/1000 gal				

500 g - Item # 15697*

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



FRUIT & MEAD

FLAVIA



For the revelation of varietal aroma compounds in aromatic whites and rosés

When to add FLAVIA:

Directly to the fermentation vessel

When to add Saccharomyces: 24 hours after adding FLAVIA

Optimal conditions: Free SO₂: <15 ppm **Temp:** >15-22°C (59-71°F)

Frequently used in Sauvignon blanc, Riesling, Pinot gris, Muscat, Colombard, rosés, cider

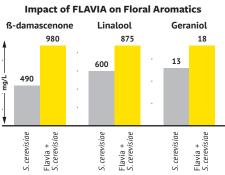
LEVEL² FLAVIA™ can release terpenes, thiols, and polysaccharides resulting in aromatically complex wines with good mouthfeel.

- · Wines have heightened tropical fruits, citrus, floral, and spicy aromas
- Positively impacts mouthfeel due to the fast release of mannoproteins
- · Non-fermentative and can tolerate approximately 3% alcohol
- · Optimal results are when FLAVIA is used with a Saccharomyces strain that also enhances varietal aromas
- Metschnikowia pulcherrima strain
- Selected in conjunction with the Universitad de Santiago de Chili (USACH)

Usage: See pg 47 for rehydration instructions. **Storage:** Store at 20°C (68°F). Once opened use immediately.

Recommended Dosage				
	250ppm	25 g/hL	2 lbs/1000 gal	

500g - Item #15244*



GAIA



For managing spoilage risks when transporting grapes or cold soaking reds

When to add GAIA:

Directly to grapes or to must undergoing cold soak

When to add Saccharomyces:

After cold soak or whenever fermentation is desired

> **Optimal conditions:** Total SO₂: <50 ppm **Temp:** 4-20°C (39-68°F)

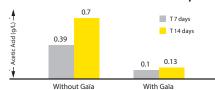
Frequently used in Pinot noir, reds undergoing cold soak

GAIA™ suppresses the growth and acetic acid production of native microorganisms like Kloeckera apiculata, acetic acid bacteria, and other microflora during the pre-fermentative stages. GAIA can be added directly to the grapes during harvest (with a sprayer or into each picking bin) or to red grapes at the beginning of cold soak.

- Minimizes production of ethyl acetate and acetic acid from native microflora
- Preserves fruit characters and aromas
- Protect grapes and must for up to 5 days if the temperature is also controlled at <10°C (<50°F)
- Non-fermentative and can tolerate approximately 3% alcohol
- Metschnikowia fructicola strain
- · Selected by the Institut Français de la Vigne et du Vin (IFV), France

Usage: See pg 47 for rehydration instructions. Storage: Store at 20°C (68°F). Once opened use immediately.

Effect of GAÏA™ on Acetic Acid Production in Must Contaminated with Kloeckera apiculata



Recommended Do		
70-250 ppm	7-25 g/hL	0.6-2 lbs/1000 gal

500g - Item #15686*

HOW TO DETERMINE THE RIGHT DOSE OF GAIA™ & LEVEL² INITIA™ DID YOU KNOW?

The recommended dosages for GAIA™ and LEVEL² INITIA™ are 7-25 g/hL, but how do you determine the right dosage for you? There are four main factors to consider:

- 1. WHEN GAIA OR INITIA IS ADDED
- 2. TEMPERATURE OF GRAPES, JUICE, OR MUST
- 3. LENGTH OF TIME BIOPROTECTION IS NEEDED
- 4. IS FRUIT CLEAN OR COMPROMISED?

Each of these factors affect the activity of native microflora. This includes spoilage organisms that may produce offodors and flavors (e.g. volatile acidity), and unwanted Saccharomyces yeast that may initiate fermentation. Use the charts below to determine what factors may affect your juice or must and adapt the dosage rate accordingly.

Use	When adding GAIA/INITIA to picking bins in the vineyard			
7 g/hL	Grapes are cold (< 10°C/50°F)			
if:	Protection needed for less than 4 days			
	Clean fruit			
Use	When adding GAIA/INITIA to grapes upon receipt or to freshly pressed juice			
20 g/hL	Grapes/juice is cool (around 10°C/50°F)			
if:	Protection needed for more than 4 days			
	Clean fruit			

Use	When adding GAIA/INITIA to grapes upon receipt or to freshly pressed juice			
10 g/hL	Grapes/juice is cold (< 10°C/50°F)			
if:	Protection needed for less than 4 days			
	Clean fruit			
Use	When adding GAIA/INITIA to machine harvested fruit or to freshly pressed juice			
Use				
25 g/hL	Grapes/juice is not cool (> 10°C/50°F)			
25 g/hL if:	Grapes/juice is not cool (> 10°C/50°F) Protection needed for more than 4 days			

If any of these factors are notably challenging, use the maximum dosage (25 g/hL) and inoculate with Saccharomyces as soon as possible to initiate fermentation.

INITIA



Protects aromas and color from oxidative damage

When to add INITIA:

Directly to freshly pressed juice in the press pan

When to add Saccharomyces:

Once the juice has been racked to the fermentation vessel

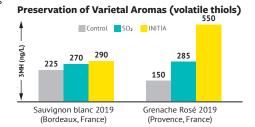
> Optimal conditions: Free SO₂: <15 ppm Total SO_2 : <40 ppm Temp: 4-20°C (39-68°F)

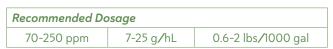
Frequently used in aromatic whites, rosés, cider

LEVEL² INITIA™ is a novel non-Saccharomyces yeast that acts as an antioxidant and an antimicrobial agent preserving aromatic juice from oxidative browning and aroma degradation as well as suppresses the growth of native, volatile acidity producing yeast and bacteria.

- Limits browning by quickly consuming oxygen and copper ions
- Preserves aromatic precursors (thiols) from oxidative degradation
- Outcompetes native yeast and bacteria limiting their VA production
- Very low fermentative abilities, grows well at low temperature and can tolerate up to 3% alcohol
- Metschnikowia pulcherrima strain
- · Isolated in Burgundy by the Institut Français de la Vigne et du Vin (IFV) in Beaune, France

Usage: See pg 47 for rehydration instructions. Storage: Store at 20°C (68°F). Once opened use immediately.





500g - Item #15273*

MICRO CONTROL

LAKTIA

Naturally acidifies grapes

When to add LAKTIA:

Directly to fermentation vessel

When to add Saccharomyces: 24-72 hours after LAKTIA, or once lactic acid goal is met

> Optimal conditions: Free SO₂: <15 ppm Total SO₂: <40ppm Temp: 14-28°C (57-82°F)

Frequently used in hot climate grapes that are lacking in acidity, cider

LEVEL² LAKTIA™ is added at the beginning of fermentation where it produces lactic acid from sugar (glucose), impacting acid levels and bringing freshness and aromatic complexity to wines.

- 1 g/L glucose metabolized by LAKTIA results in 1 g/L lactic acid
- Can impact pH and titratable acidity
- The longer LAKTIA in is the juice prior to *Saccharomyces*, the higher the lactic acid concentration will be.
- Lactic acid >3 g/L can inhibit malolactic bacteria
- · Very low fermentative abilities, grows well at low temperatures and can tolerate up to 7% alcohol
- Has a high demand for nitrogen and YAN should be determined prior to LAKTIA use and again prior to Saccharomyces inoculation
- Lachancea thermotolerans strain
- · Isolated from Rioja, Spain by the Lallemand Oenology R&D team

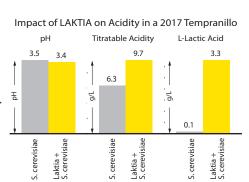
To optimize lactic acid production:

LAKTIA works most efficiently in juices free of SO₂. If SO₂ is present, the juice temperature must be >20°C (68°F). Delay Saccharomyces inoculation up to 72 hours post-LAKTIA addition.

Usage: See pg 47 for rehydration instructions. Storage: Store at 20°C (68°F). Once opened use immediately.

Recommend		
250ppm	25 g/hL	2 lbs/1000 gal

500 g - Item #15253*



PROTOCOL

NON-SACCHAROMYCES YEAST: BEST PRACTICES & REHYDRATION INSTRUCTIONS

Consult charts below when using a non-Saccharomyces yeast for the following reasons:

- Different strains of non-Sacc yeast are added at different points in the winemaking process
- Non-Sacc yeast cannot complete alcoholic fermentation because they are inhibited by alcohol. When using a non-Saccharomyces strain, subsequent inoculation with a Saccharomyces strain is required.
- Each non-Sacc yeast strain operates best under certain temperature and free SO₂ conditions.

TIMING OF INOCULATIONS:

	BIODIVA™	FLAVIA™	GAIA™	INITIA™	LAKTIA™
When to add non-Saccharomyces: When to add saccharomyces: To the tank prior to alcoholic fermentation To the tank prior to alcoholic fermentation When to add Saccharomyces: After 1.5-4 °Brix drop 24 hours after FLAVIA		to alcoholic transport or cold during transport or		To the tank prior to alcoholic fermentation	
		Upon juice receipt or after cold soak	Once juice is racked to fermentation vessel	24-72 hours after LAKTIA	

OPTIMAL CONDITIONS:

	BIODIVA™	FLAVIA™	GAIA™	INITIA™	LAKTIA™
Free SO ₂ (ppm)	<mark>(ppm) <15 <15</mark>		<50 Total SO2	<15	<15
Temperature	>16°C (61°F)	15-22°C (59-71°F)	4-20°C (39-68°F)	4-20°C (39-68°F)	>14°C (57°F)

INSTRUCTIONS:

- Step 1: Rehydrate non-Sacc yeast in 10x its weight of chlorine-free water at 30°C (86°F). Stir.
- Step 2: Wait 15 minutes and stir again.
- Step 3: Slowly add juice or must to the yeast slurry until the temperature of the yeast slurry drops by 10°C. Wait 15 min. Repeat this step until slurry is within 10°C of must. NOTE: this step should not exceed 45 minutes total.
- Step 4: Inoculate.
- Step 5: After inoculating with your chosen non-Sacc yeast strain, consult the chart above to determine when to inoculate with Saccharomyces to finish alcoholic fermentation.



Step 1









Step 2

Step 3

Step 4

ARTICLE

YEAST REHYDRATION IS BETTER THAN DIRECT INOCULATION

In recent years, the wine industry has been offered various direct inoculation yeasts that can be added directly to juice or must without rehydration. These yeast may seem attractive due to ease of use and promises of the same performance as classically rehydrated yeast. However, we have found that directly inoculated yeast may not perform the same as rehydrated yeast. Direct inoculation can result in underperforming yeast, leading to long and potentially sluggish fermentations and diminished wine aroma, flavor, and mouthfeel.

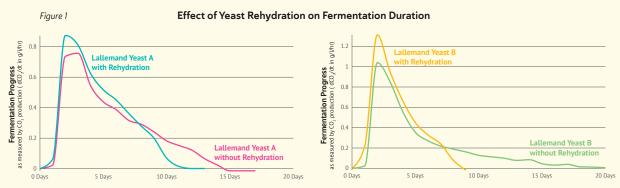
BENEFITS OF YEAST REHYDRATION

Yeast inoculation protocols that optimize yeast metabolic activities have been extensively researched. In almost all cases, yeast rehydration optimizes fermentation kinetics (implantation, lag phase length, fermentation duration) and/or sensory contribution (aroma production and conversion, mouthfeel contribution).

Yeast rehydration can improve fermentation kinetics

Yeast rehydration can decrease fermentation duration. As seen in figure 1, rehydration decreased fermentation length by 5-10 days depending on strain.

Yeast rehydration can improve aromatic expression



Yeast rehydration can improve aromas generated from yeast (esters) as well as optimize expression of aromas coming from the grapes (thiols, etc.). As seen in figure 2, in all trials rehydration improved aromatic expression even if the fermentation duration was not impacted.

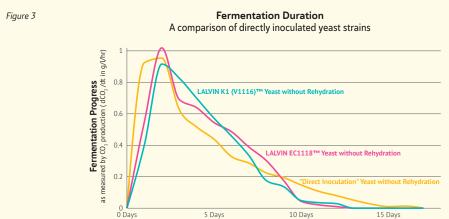
Figure 2 Effect of Yeast Rehydration on Fermentation Duration and Aroma Production
A comparison of strains marketed for direct inoculation (DI)



WHAT ARE "DIRECT INOCULATION" YEAST?

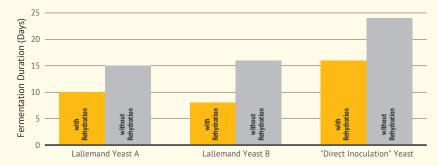
Most commercially available yeast that are marketed for direct inoculation are not produced in any special way to prepare them for direct inoculation. Rather, they are strains produced in the standard way that have been shown to perform adequately when directly inoculated.

As seen in figure 3, other strains not marketed as direct inoculation, perform as well or better without rehydration when compared to "direct inoculation" yeast. When using LALVIN K1 (V1116) $^{\text{TM}}$ and LALVIN EC1118 $^{\text{TM}}$ without rehydration, they finished fermentation three days ahead of the "direct inoculation" strain.



Lallemand Oenology has shown that even strains marketed for direct inoculation perform better when rehydrated. In figure 4, "Direct Inoculation" Yeast X took 9 days longer to ferment without rehydration. Furthermore, there are many strains not marketed for direct inoculation that also perform adequately when directly inoculated. In the trial below, all strains performed better with rehydration. Even without rehydration, the Lallemand strains outperformed the rehydrated "Direct Inoculation" strain.

Figure 4 Effect of Yeast Rehydration on Fermentation Duration
A comparison of strains marketed for rehydration vs. direct inoculation



WHEN DOES DIRECT INOCULATION MAKE SENSE?

Direct inoculation may save time and labor during the inoculation process and there may be circumstances when these savings outweigh the risks to fermentation performance. Direct inoculation may make sense if:

- Fermentation conditions are easy (low potential alcohol, high pH, temperature control is available, adequate YAN/nutrition, optimal NTUs, hygiene of winery and cellar are good, etc)
- Quick fermentations are not important for winery logistics (tank turnover)
- The chosen commercial yeast performs adequately when directly inoculated (we recommend K1 and EC1118)
- Sensory contribution from yeast is not important (positive aromas, flavors, and mouthfeel)

RECOMMENDATIONS

To ensure efficient and complete fermentation and maximize yeast sensory contributions, we recommend that active dry yeast should be rehydrated in warm water prior to inoculation. We believe this is the best way to prevent long and potentially sluggish fermentations and maximize wine aroma, flavor, and mouthfeel.

This article was meant to discuss the benefits of rehydration and is not an in depth discussion of all the ways that yeast performance (kinetics and aromas) can be improved. Please see our *Saccharomyces* Yeast Rehydration protocol for more information.



Scott Laboratories' yeast nutrients are the gold standard.

Scott Laboratories and Lallemand Oenology have been providing customized yeast nutrients since the late 1970s. Our applied knowledge on yeast nutrition is second-to-none and our research has advanced the wine industry's knowledge of good fermentation practices. We were the first to develop a complete nutrient for fermentation (FERMAID), the first to patent the use of rehydration nutrients (GO-FERM), and we continue to push the understanding of yeast nutrient impact on wine quality with the launch of the STIMULA nutrient line.

Our nutrients go beyond preventing stuck fermentations. We discovered that specific nutrients can protect and stimulate aromas, protect color, and help manage negative sensory compounds. Our advanced and unrivaled yeast nutrients and derivatives help take your wine to the next level.



SUPPLEMENTING YEAST NUTRIENTS FOR SUCCESS WHAT NUTRIENTS DO YEAST NEED?

YEAST

Nitrogen controls cell number, fermentation rate, and the production of some aroma compounds. Yeast assimilable nitrogen (YAN) consists of most amino acids, ammonia, and some types of peptides. The amount of YAN in the juice or must will vary based on geographic location, grape variety, maturity at harvest, and processing decisions.

Survival factors (sterols and unsaturated fatty acids) are essential for healthy plasma membranes which help yeast withstand increasing ethanol concentrations. When yeast have sufficient survival factors, sugar uptake can continue and the toxic effects of ethanol and temperature can be minimized.

Vitamins and minerals. Vitamins and minerals are cofactors for growth and metabolism and yeast cannot survive without them.

Interestingly, there is also a link between vitamins and aroma production. When vitamins are present in an assimilable form, fruitiness is increased and negative sulfur off-odors are decreased.

Additionally, the higher the YAN, the greater the cell number, which means more vitamins and minerals are required.

WHAT NUTRIENTS ARE PRESENT IN GRAPES?

While grapes contain nitrogen, vitamins, minerals, and survival factors, they often do not contain them in levels that will support healthy fermentation. YAN supplementation is often necessary.

YAN in grapes exists in two main forms: ammonia and amino acids. Yeast use each of these nitrogen sources differently. Although yeast prefer ammonia, it is used quickly and does not give yeast the staying power to complete fermentation, nor does it support the production of positive aromas. In general, amino acids are taken up more slowly. This form of nitrogen lasts longer and can give yeast the staying power to complete fermentation and importantly, amino acids also support yeast aroma production.

HOW MUCH NUTRIENT SHOULD BE ADDED?

The amount of supplementation required for a healthy fermentation depends on multiple factors:

Initial juice chemistry. Higher sugar and lower YAN fermentations will both require higher levels of YAN supplementation.

It is crucial to measure YAN and sugar immediately prior to fermentation. Wineries may conduct pre-fermentation processes like clarification or cold-soaking that take a few days. During this time, native microflora will consume YAN as well as vitamins and minerals, even in healthy fruit and juices or musts. Measuring YAN before these processes may not accurately represent the YAN at inoculation.

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.

Yeast strain nutrient needs. Different yeast strains have different nitrogen demands and are classified as low, medium or high nitrogen need according to the following:

- Low nitrogen-demand: 7.5 ppm YAN per 1 °Brix
- Medium nitrogen-demand: 9 ppm YAN per 1 °Brix
- High nitrogen-demand: 12.5 ppm YAN per 1°Brix

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

Fermentation temperature. Higher fermentation temperatures stimulate fermentation rate and yeast growth, thereby requiring more nitrogen than cooler fermentations.

See pg. 63 for the protocol: Developing a Yeast Nutrition Plan and be sure to keep the above considerations in mind.

DID YOU KNOW?

HOW TO CALCULATE YAN

YAN is calculated using both forms of assimilable nitrogen in grapes (ammonia and amino acids):

$YAN = (0.8225 \times [NH_{\tau}]) + [PAN]$

Ammonia (NH₃): Typical methods for measuring ammonia (NH₃) report total ammonia concentration but only 82.25% of ammonia is nitrogen and this must be accounted for when calculating YAN.

Amino acids (PAN): Amino acids are reported as PAN (primary amino nitrogen), AAN (assimilable amino nitrogen), or FAN (free amino nitrogen), which are interchangeable terms. Typical amino acid analysis measures only the nitrogen content of assimilable amino acids, so that number is used directly when calculating YAN.

It is important to note that yeast cannot assimilate the amino acid proline, so this measurement typically excludes proline.

QUICK GUIDE TO CHOOSING YEAST NUTRIENTS & DERIVATIVES

NUTRIENT TYPE	REHY	DRATION NUTR	IENTS		FERM	ENTATION NUTF	RIENTS	
PRODUCT NAME	GO-FERM STEROL FLASH	GO-FERM PROTECT EVOLUTION	GO-FERM	STIMULA CABERNET	STIMULA CHARDON- NAY	STIMULA PINOT NOIR	STIMULA SAUVIGNON BLANC	STIMULA SYRAH
STAGE OF WINEMAKING	During yeast rehydration				During	g alcoholic fermer	ntation	
PRIMARY ACTIVITY	mentation kine to maximal ye	enhances fer- tics, contributes ast vitality and roduction	Enhances fermentation	Stimulates red and black fruit ester production, minimizes	Stimulates white/yel- low fruit and floral ester production	white/yel- low fruit and floral ester production		Optimizes the expression of dark fruit thiols, floral aromas, minimizes sulfur
	Super speedy rehydration, eliminates need for warm water	Requires warm water and acclimitzation steps	kinetics	greenness, and ehances fermentation performance	and enhances fermentation performance	sulfur off- odors, and enhances fermentation performance	off-odor production, and enhances fermentation performance	off-odor production, and enhances fermentation performance
BEST USED IN	All wines			Big reds, Bor- deaux-style reds	Fruity and floral whites and rosés	Pinot noir and other light-bodied reds, especially if susceptible to herba- ceousness and H ₂ S	Aromatic whites and rosés, espe- cially if thiol- containing	Medium-bod- ied reds, especially if susceptible to H ₂ S
FORMULA- TION	Autolyzed yeast extra rich in sterols , vitamins, and minerals	Autolyzed yeast rich in sterols , vitamins, and minerals	Autolyzed yeast rich in vitamins, and minerals	Organic nitrogen (amino acids, specific peptides), vitamins, and minerals. The am and type of each will vary depending on the product, accounting for their differ sensory impacts.				
MEASURABLE YAN (in ppm) AT 40g/hL	Contains some nitrogen but is not a significant source of YAN and is not a replacement for fermentation nutrients.			16	16	16	16	16
YAN EQUIV- ALENTS (in ppm) AT 40g/ hL				64-96	64-96	64-96	64-96	64-96
OMRI LISTED*	NO	YES	YES	NO	NO	NO	NO	NO
PG#	54	55	55	56	57	58	58	59

What Are Rehydration Nutrients?

are added when rehydrating yeast.

What Are Fermentation Nutrients?

Rehydration nutrients supply yeast with vitamins and miner- Fermentation nutrients supply the yeast with nitrogen (YAN). als, and newer GO-FERM™ formulations provide survival fac- We recommend adding these nutrients to the juice at inoculators (sterols and unsaturated fatty acids). They also contribute tion and again partway through fermentation. Supplementing some assimilable nitrogen, but they should not be considered YAN at the beginning of fermentation ensures that a sufficient significant sources of YAN. Vitamins and minerals are essen-yeast population to sustain fermentation will develop. Suppletial for cell function, whereas survival factors support healthy menting YAN during fermentation avoids yeast stress which yeast cell membranes. Survival factors and certain minerals may result in off-odor development and stuck/sluggish fermenimprove the yeasts' tolerance to ethanol, whereas vitamins tations. Our STIMULA line of fermentation nutrients can supply support growth and aroma production. Rehydration nutrients YAN while also stimulating yeast metabolic pathways that promote the production of desirable aroma compounds.

DID YOU KNOW?

UNDERSTANDING YAN VS. YAN EQUIVALENTS:

Most academic recommendations for YAN supplementation have been based on measurable YAN, often supplemented in the form of inorganic nitrogen (usually DAP). Lallemand Oenology has demonstrated that organic forms of YAN are 4-6 times more efficient than inorganic YAN. This means that a 40 g/hL dose of FERMAID O has 16 ppm measurable YAN but a YAN equivalent of 64-96 ppm. We have taken this efficiency into account throughout our recommendations.

QUICK GUIDE TO CHOOSING YEAST NUTRIENTS & DERIVATIVES

FERMENTATIO	N NUTRIENTS	YEAST DERIVATIVE NUTRIENTS						
FERMAID O	FERMAID K	GLUTASTAR	RESKUE	NOBLESSE	OPTI-MUM RED	OPTI-RED	OPTI-WHITE	REDULESS
During alcoholi	ic fermentation	Anytime before or during fermentation (alcoholic or malolactic)						
Workhorse yeast nutrient for clean, steady fer- ments with en- hanced aroma production	Basic yeast nutrient for improved yeast per- formance. Used for supplementing very low YAN fermentations.	Acts as an antioxidant (protects color and aromas) in aromatic whites and rosés, and can help lower SO ₂ use	Removes toxic compounds to reinvigo-rate sluggish and stuck fermentations (alcoholic and malolactic)	Enhances mouthfeel and over time increases perception of sweetness	Intensifies and stabilizes color, softens mouthfeel, and minimizes greenness	Stabilizes color and softens mouthfeel	Quickly builds mouthfeel in complex whites and rosés, and can act as an antioxidant (protects color and aromas)	Combats sul- fur off-odors and other neg- ative sensory compounds
All wines	Wines with very low star- ing YAN	Aromatic white and rosé juice	All wines	All wines	High tannin reds	Medium and light tannin reds	Complex whites and rosés	All wines
Organic nitrogen (amino acids), vitamins, and minerals.	Blend of or- ganic nitrogen (amino acids) and inorganic nitrogen (DAP), with added vitamins, and minerals	Fully autolyzed yeast rich in reduced gluth- ione (GSH) and other powerful antioxidant peptides	Inactivated yeast with high bioadsorptive properties for short and medium chain fatty acids	Partially au- tolyzed yeast rich in high and low mo- lecular weight polysaccha- rides	Fully autolyzed yeast rich in high molecular weight poly- saccharides and oligosac- charides	Partially autolyzed yeast rich in high molecular weight poly- saccharides	Partially autolyzed yeast rich in polysaccha- rides, contains some reduced glutathione (GSH)	Inactivated yeast with cell walls rich in copper
64-96	40	Contains some nitrogen but is not a significant source of YAN and is not a replacement for fermentation nutrients.						
YES	NO	YES	NO	YES	YES	YES	YES	YES
56	59	60	60	61	61	61	62	62

What Are Yeast Derivative Nutrients?

Yeast derivative nutrients are made from highly-specialized yeast strains and prepared with specific techniques to enrich the nutrient in benefical compounds important for winemaking. These compounds include:

- · Glutathione and other peptides which have antioxidant effects
- Polysaccharides that can improve mouthfeel by reducing astringency and increasing volume
- Polysaccharides that can stabilize color
- Compounds that can reduce sulfur off-odors

Yeast derivative nutrients should be added either prior to inoculation, during fermentation, or towards the end of fermentation for their ability to protect positive sensory compounds and/or remove negative sensory compounds. While these products contribute some nitrogen to fermentation, they should not be considered significant sources of YAN.

^{*}of note: some products that are not OMRI-listed may still be used in some organic wine programs. Check with applicable organic certifiers.

GO-Rehyd

NEW

GO-FERM STEROL FLASH

LALLEMAN

Rehydration nutrient for use with cool water

Nutrient Type:

Rehydration nutrient

When to add:

During yeast rehydration

Provides:

Vitamins and minerals that help yeast withstand the conditions of fermentation, higher levels of survival factors to help yeast tolerate ethanol

YAN contribution: Insignificant

Frequently used in all juices and musts, but especially in aromatic varietals, highly clarified juices, barrel fermentations, high Brix or cold-soak musts, or situations where reliable hot water is unavailable

GO-FERM STEROL FLASH $^{\text{m}}$ is a revolutionary new yeast rehydration nutrient that is **fast, easy to use, and saves time, labor, and water** without compromising on yeast viability and vitality.

• Improves fermentation kinetics and aroma production

Rehydration Nutrients

- Allows yeast to be rehydrated in cool water (15°C/60°F) without any loss of viability or vitality
- Eliminates the need for acclimatization steps (rehydrated yeast can be added directly to juice or must after 15 minutes)
- Requires 50% less water than GO-FERM $^{™}$ /GO-FERM PROTECT EVOLUTION $^{™}$
- Non-clumping, instantly disperses in cool water
- Derived from autolyzed yeast, GO-FERM STEROL FLASH provides optimized levels of micronutrients (vitamins and minerals) and extremly high levels of survival factors including sterols and unsaturated fatty acids

Usage: Mix GO-FERM STEROL FLASH in 10 times its weight of clean 15°C (60°F) water. Add 25 g/hL (2 lb/1000 gal) of active dried yeast, stir gently and allow the yeast to rehydrate for 15 minutes. Gently stir again, then add to the tank or barrel and mix to homogenize. There is no need to acclimate the rehydrated yeast to the juice/must temperature.

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

	Recommended Dosage	30 g/hL	2.5 lb/1000 gal
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2.5 kg – Item #15166*

10kg - Item #15167*



Continual R&D for product improvement is a keystone of Lallemand Oenology. Our GO-FERM rehydration nutrients are a prime example.

2000 2013 2023

FERM" was the first rehydration nutrient introduced to the wine industry back 2000. It was developed to enhance fermentation kinetics and avoid fermentation problems.

FERM PROTECT EVOLUTION, released in 2013, advanced fermentation success by contributing to maximal yeast vitality for sustained fermentative power and aroma production.

GO-FERM PROTECT EVOLUTION has been optimized with respect to the quantity and quality of micronutrients and sterols it provides to the yeast during the rehydration phase.

This year we are introducing the latest generation of rehydration nutrients; ••-FERM STEROL FLASH." This product brings all of the advantages of GO-FERM PROTECT EVOLUTION but allows the yeast to be rehydrated with cellar temperature water, bypassing the need for acclimatization and significantly shortening the yeast rehydration process.

GO-FERM STEROL FLASH saves *serious* time during rehydration

GO-FERM™ & GO-FERM PROTECT EVOLUTION™

Using *hot water* during rehydration means multiple acclimitzation steps (15–20 min each) are necessary before adding yeast to cold juice or must.



TOTAL TIME: ≥ 1 hour

GO-FERM STEROL FLASH™

Using *cool water* eliminates the need for acclimatization steps. Dissolve GO-FERM STEROL FLASH in water, rehydrate yeast, and inoculate!



TOTAL TIME: 20 min

GO-FERM PROTECT EVOLUTION

LALLEMAND OMRI

Rehydration nutrient for healthier yeast, improved fermentation kinetics, and cleaner fermentations: OMRI listed

Nutrient Type:

Rehydration nutrient

When to Add:

During yeast rehydration

Provides:

Vitamins and minerals that help yeast withstand the conditions of fermentation, survival factors to help yeast tolerate ethanol

YAN contribution: Insignificant

Frequently used in all juices/musts, but especially must >24 °Brix, highly clarified juices, barrel-fermentations, cold-soak must, cider

Scan here learn more about the magic of GO-FERM™ rehydration nutrient48s - scottlab.com/qo-ferm

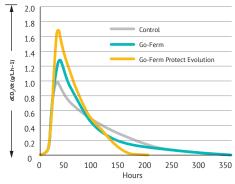


GO-FERM PROTECT EVOLUTION™ supports healthy fermentations while increasing varietal aroma uptake and aroma complexity.

- Results in faster onset and cleaner finish of fermentation (Figure 1), healthier yeast that can better withstand fermentation stresses like ethanol, acid, sugar, and temperature (Figure 2), greater expression of varietal aromas (Figure 3), and fewer fermentation sensory issues like volatile acidity and H₂S
- Can replace the recommended second oxygen addition at 1/3 sugar depletion due to enhanced sterol content (especially useful for barrel fermentations or reductive styles of winemaking)
- Yeast rehydration nutrient derived from autolyzed wine yeast with optimized bioavailability of micronutrients (vitamins and minerals), survival factors (sterols and unsaturated fatty acids)

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)

Figure 1: Impact of GO-FERM PROTECT EVOLUTION on Fermentation Kinetics in a High Nitrogen, Low Sugar Ferment



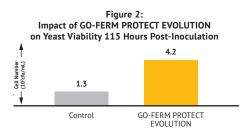


Figure 3:
Impact of GO-FERM PROTECT EVOLUTION
vs Oxygen on Varietal Thiol Production

400
310
300
300
3MH
3MH
GO-FERM PROTECT
EVOLUTION
(Yeast using 0, to produce sterols)

difference. Acclimatize yeast as necessary (see pg 37 for more details).

 $\textbf{Note:} \ \ \text{Due to the unique nature of GO-FERM and GO-FERM PROTECT EVOLUTION, they will not go into solution completely.}$

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

Recommended Dosage	30 g/hL	2.5 lb/1000 gal
2.5 kg – Item #15103*	10 kg – Item #15251*	

GO-FERM



Yeast rehydration nutrient; OMRI listed

Nutrient Type:

Rehydration Nutrient

When to Add:

During yeast rehydration

Provides:

Vitamins and minerals that help yeast withstand the conditions of fermentation

YAN contribution:

Insignificant

Frequently used in must <24 °Brix, whites, rosés, reds

GO-FERM™ is the original yeast rehydration nutrient.

- Allows faster onset of fermentation and enhances fermentation kinetics
- · Helps avoid fermentation sensory issues like hydrogen sulfide
- Yeast rehydration nutrient derived from autolyzed wine yeast with optimized bioavailability of micronutrients (vitamins and minerals)

Usage: Usage: Mix GO-FERM in 20 times its weight of clean 43° C (110° F) water. Then, follow the applicable rehydration procedure (pg 37).

Note: Due to the unique nature of GO-FERM AND GO-FERM PROTECT EVOLUTION, they will not go into solution completely.

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

Recommended Dosage	30g/hL	2.5 lb/1000 gal		
1 kg – Item #15149*	2.5 kg – Item #15135*	10 kg – Item #15161*		

Fermentation Nutrients

FERMAID O



YAN source supplying organic nitrogen (amino acids); OMRI listed

Nutrient Type:

Fermentation Nutrient

When to Add:

2-3 °Brix drop and/or 1/3 sugar depletion

Provides:

YAN in the form of organic nitrogen

Measurable YAN at 40 g/hL dose: 16 ppm YAN equivalents at 40 g/hL dose: 64-96 ppm

Frequently used in reds, whites, rosés, and ciders with medium or high YAN. Can be used in low YAN situations in conjunction with STIMULA nutrients

FERMAID 0^{m} is an organic nitrogen source that helps to nourish yeast, improve aromas, and allows for good control over fermentation.

- Reliably lowers peak fermentation temperatures and improves fermentation kinetics (especially at the end of fermentation), resulting in fewer sulfur offodors like $\rm H_2S$
- Due to FERMAID O's highly consistent and balanced amino acid profile, the nitrogen lasts longer and less nutrient is needed than when using conventional nitrogen sources (DAP)
- FERMAID O use has been correlated with positive aromatic expression (thiols and esters) and enhanced mouthfeel
- Blend of highly specific inactivated yeast fractions that are rich in assimilable amino acids (organic nitrogen), small peptides, essential vitamins, and minerals

Usage: Suspend FERMAID O in water or juice/must and mix well before adding, especially during fermentation to avoid CO₂ 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.

Recommended Dosage	10-40 g/hL	0.83-3.3 lb/1000 gal
2.5 kg – Item #15067*	10 kg – Item #15107*	

STIMULA CABERNET



YAN source that also stimulates yeast to produce red and black fruit aromas (esters)

Nutrient Type:

Fermentation Nutrient

When to Add:

1/3 sugar depletion

Provides:

YAN in the form of organic nitrogen (amino acids), vitamins and minerals that stimulate yeast to produce red and black fruit esters

Measurable YAN at 40g/hL dose: 16 ppm

YAN equivalents at 40g/hL dose: 64-96 ppm

Frequently used in Bordeaux style reds, fruit-forward reds, musts with underripe characters

STIMULA CABERNET™ is an organic nitrogen source that contributes YAN while stimulating the yeast's aroma synthesis pathways that produce fruity esters in red wines.

- Results in increased red and black fruit aromas (see Figure), aromatic complexity, length, and diminished vegetal/herbaceous notes
- Add at 1/3 sugar depletion
- Well-balanced nutrient rich in specific amino acids, small peptides, natural vitamins (biotin), and minerals (zinc and magnesium)
- Latest generation of yeast-based nutrients focusing on nutrition and aroma production

Usage: Mix STIMULA CABERNET in 10 times its weight of clean water or must and add to the fermentation at 1/3 sugar depletion. It is essential that the timing of addition is respected. STIMULA CABERNET 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.

Impact of STIMULA CABERNET™ on red and black fruits aromas on a 2019 Cabernet Sauvignon from Bordeaux, France Must analysis: 238g/L sugar, 218ppm YAN, pH3.46

267

Control
STIMULA

43 50

Red Fruit Esters

Black Fruit Esters

*An OAV value is the sum of the aroma compounds compared to their sensory threshold. A positive number means aromas are above sensory threshold.

Recommended Dosage:	40a/hl	3.3 lb/1000 gal

1kg - Item #15268*

10kg - Item #15288*

DID YOU KNOW?

WHY WE RECOMMEND STAGED NUTRIENT ADDS

Our recommendation for optimal yeast nutrition includes adding nutrients during rehydration, after lag phase, and partway through fermentation. We recognize that production constraints may not be compatible with multiple nutrient additions. It is more important to sufficiently compensate for nutrient deficiency than it is to achieve optimal addition timing. Understanding our justification for the timing of each nutrient addition may help you develop the best nutrient regime for your process:

During rehydration: Rehydration nutrients should always be added during the yeast rehydration phase to supply the often-deficient vitamins and minerals, sterols, and unsaturated fatty acids (survival factors).

After lag phase (2-3 °Brix drop): At the beginning of fermentation, yeast have a high demand for vitamins and minerals and a moderate demand for assimilable nitrogen (YAN). However, adding nutrients to the fermentation vessel before 2-3 °Brix drop is inefficient. These nutrients will be bound up to juice or must components or utilized by native microflora. Delaying the nutrient until lag phase is over and *Saccharomyces* has implanted means that your nutrient supplements are going to your yeast of choice.

During fermentation (1/3 sugar depletion): When yeast cells are actively fermenting, they have a high demand for nitrogen (YAN). Yeast cells quickly utilize the YAN present at the beginning of fermentation and can encounter deficit conditions midway through fermentation and this can occur irrespective of starting YAN. Therefore, nutrients should be added during fermentation (at or around 1/3 sugar depletion) to replenish YAN levels.

STIMULA CHARDONNAY



YAN source that also stimulates yeast to produce white/yellow fruit and floral aromas (esters)

Nutrient Type:

Fermentation Nutrient

When to Add:

1/3 sugar depletion

Provides:

YAN in the form of organic nitrogen (amino acids), vitamins and minerals that stimulate yeast to produce white/yellow fruit and floral esters

Measurable YAN at 40 g/hL dose: 16 ppm YAN equivalents at 40 g/hL dose: 64-96 ppm

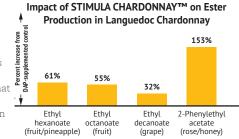
Frequently used in aromatic whites, rosés, cider

STIMULA CHARDONNAY™ is an organic nitrogen source that contributes YAN while stimulating yeast's production of fruity and floral esters in white and rosé wines.

- Wines are aromatically intense and complex with increased fruity (white and yellow fruits), tropical, and floral aromas (see Figure)
- · Palate is lengthened and mouthfeel softened
- Add at 1/3 sugar depletion
- Well-balanced nutrient rich in specific amino acids, small peptides, sterols, vitamins (biotin, pyridoxine), and minerals (magnesium and zinc)
- Latest generation of yeast-based nutrients focusing on nutrition and aroma production

Usage: Mix STIMULA CHARDONNAY in 10 times its weight of clean water or juice and add to the fermentation at ¼ 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.



Recommended Dosage	40g/hL	3.3 lb/1000 gal

1 kg - Item #15245*

10 kg - Item #15260*

NEW

STIMULA PINOT NOIR



YAN source that elevates Pinot noir characteristics

Nutrient Type:

Fermentation Nutrient

When to Add:

2-3 °Brix drop Provides:

YAN in the form of organic nitrogen (amino acids), vitamins and minerals

Measurable YAN at 40g/hL dose: 16 ppm YAN equivalents at 40g/hL dose: 64-96 ppm

Frequently used in Pinot noir, light-bodied reds

STIMULA PINOT NOIR™ optimizes the yeast's ability to reveal varietal compounds and produce fruity aromas.

- Wines display more black and red fruit aromas, increased floral notes, and increased aromatic complexity
- Herbaceous and vegetative notes are masked, and wines have fewer sulfur off-odors like $\rm H_2S$
- Added at the onset of fermentation, it nourishes the yeast, minimizes yeast stress, and increases ethanol tolerance
- Well balanced nutrient rich in nitrogen in the form of amino acids and small peptides, vitamins, minerals, and sterols
- Latest generation of yeast-based nutrients focusing on nutrition and aroma production

Usage: Mix STIMULA PINOT NOIR in 10 times its weight of clean water or must and add to the fermentation at 2–3 °Brix drop. It is essential that the timing of addition is respected. STIMULA PINOT NOIR 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.

Recommended Dosage:	40g/hL	3.3 lb/1000 gal
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1 kg - Item #15290*

STIMULA SAUVIGNON BLANC



YAN source that also stimulates the release of varietal aromas (tropical & citrus) in whites and rosés

Nutrient Type:

Fermentation Nutrient

When to Add: 2-3 °Brix drop

Provides:

YAN in the form of organic nitrogen (amino acids), vitamins and minerals that stimulate the release of tropical and citrus varietal aromas

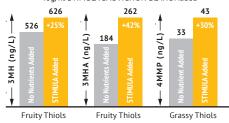
Measurable YAN at 40 g/hL dose: 16 ppm YAN equivalents at 40 g/hL dose: 64-96 ppm

Frequently used in Sauvignon blanc, Riesling, Pinot gris, Chardonnay, Semillon, rosés STIMULA SAUVIGNON BLANC™ is an organic nitrogen source that contributes YAN while stimulating the yeast's ability to reveal and enhance varietal compounds in white and rosé wines.

- Added at the onset of active fermentation, the specific formulation helps yeast take up aroma precursors (varietal thiols, terpenes, and norisoprenoids) and convert them into odor-active compounds
- Enhances varietal characteristics resulting in increased tropical fruits, citrus, and boxwood/gooseberry aromas (Figure). Wines also have a fuller mouthfeel and fewer sulfur off-odors, like $\rm H_oS$
- When used to produce rosé wines, blackcurrant aromas can also be present
- Well-balanced nutrient rich in amino acids, vitamins (pantothenate, thiamin, and folic acid), minerals (zinc and manganese), and sterols
- Latest generation of yeast-based nutrients focusing on nutrition and aroma production

Usage: Mix STIMULA SAUVIGNON BLANC in 10 times its weight of clean 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.

Impact of STIMULA SAUVIGNON BLANC™ on Fruity & Grassy Thiols in 2018 Napa Valley Sauvignon blanc 40g/hl STIMULA SAUVIGNON BLANC Added



Recommended Dosage	40g/hL	3.3 lb/1000 gal

1 kg - Item #15246*

10 kg - Item #15255 *

STIMULA SYRAH



YAN source that also stimulates the release of varietal aromas (floral & spicy) in reds

Nutrient Type:Fermentation Nutrient

When to Add: 2-3 °Brix drop

Provides:

YAN in the form of organic nitrogen (amino acids), vitamins and minerals that stimulate the release of floral and spicy varietal aromas

Measurable YAN at 40g/hL dose: 16 ppm YAN equivalents at 40g/hL dose: 64-96 ppm

Frequently used in Syrah, Tempranillo, Merlot, other reds susceptible to $\rm H_2S$ production

STIMULA SYRAH $^{\text{TM}}$ is an organic nitrogen source that contributes YAN while stimulating the yeast's ability to reveal and enhance varietal compounds in red wines.

- Added at the onset of active fermentation, the specific formulation helps yeast take up aroma precursors (varietal thiols, terpenes, and norisoprenoids) and convert them into odor-active compounds
- Wines have enhanced varietal aromas which can be displayed as increased black currant, floral (violet), or spicy aromas, and wines have fewer sulfur off-odors like $\rm H_2S$
- Well-balanced nutrient rich in amino acids and small peptides, vitamins (pantothenate and thiamin), minerals (magnesium), and sterols
- Latest generation of yeast-based nutrients focusing on nutrition and aroma production

Usage: Mix STIMULA SYRAH in 10 times its weight of clean water or must and add to the fermentation at 2–3 °Brix drop. It is essential that the timing of addition is respected. STIMULA SYRAH 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.

Impact of STIMULA SYRAH™ on volatile thiol (blackcurrant) release and conversion on a 2018 South African Syrah

Must analysis: 256g/L sugar, 156ppm YAN, pH3.54 40g/hl STIMULA SYRAH Added



Recommended Dosage	40g/hL	3.3 lb/1000 gal

1kg - Item #15269*

FERMAID K



YAN source for use in low YAN fermentations

Nutrient Type: Fermentation Nutrient

When to Add: 1/3 sugar depletion

Provides:

YAN as a blend of organic nitrogen (amino acids) and inorganic nitrogen (ammonia)

Measurable YAN at 25 g/hL dose: 25 ppm

YAN equivalents at 25 g/hL dose: 25 ppm

Frequently used in juices and musts with low starting YAN

FERMAID K™ is a complex yeast nutrient to assist with fermentation security, especially in low YAN situations.

- This reliable nutrient provides many essential key elements required by the yeast for growth and reproduction
- Best used at 1/3 sugar depletion if YAN needs cannot be met using FERMAID O or one of the STIMULA nutrients

Usage: Suspend FERMAID K in water or juice/must and mix well before adding, especially during fermentation to avoid CO₂ 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: FERMAID K is a proprietary blend of ingredients. Some of the materials in FERMAID K are listed by the TTB as acceptable in good commercial winemaking practice in 27 CFR 24.250 and some are listed in 27 CFR 24.246. For more information, please visit TTB.gov.

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

2.5 kg – Item #15073* 10 kg – Item #15070*

DIAMMONIUM PHOSPHATE (DAP)

∂ IOC

YAN source supplying inorganic nitrogen (ammonia)

Frequently used in severely YAN deficient juice or must

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.

 $\textbf{Usage:} \ \text{Suspend DAP in water or juice/must and mix well before adding, especially during fermentation to avoid $\rm CO_2$ 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.

5 kg – Item #15805*

Yeast Derivative Nutrients

GLUTASTAR



Acts as an antioxidant protecting aroma and color compounds against oxidative damage; OMRI listed

Nutrient Type:

Yeast Derivative Nutrient

When to Add:

Directly to juice post-pressing

Provides:

Glutathione in the reduced form (GSH) and specialized peptides which scavenge quinones to prevent oxidative damage

YAN contribution: Insignificant

Frequently used in aromatic whites, rosés, cider

GLUTASTAR™ protects aroma precursors and color due to its unique antioxidant capacity meaning that wines

antioxidant capacity meaning that wines are aromatic and flavorful and color is brighter.

- Positive impact on varietal and fermentation - derived aromas (Figure 1)
- Protects juice and wine color (Figure 2)
- Effects are long-lasting, leading to prolonged wine shelf-life
- Acts as an antioxidant due to its specialized (nucleophilic) peptides and reactive glutathione that scavenge quinones, halting the oxidation cascade
- Can replace SO₂ as an antioxidant in no- and low-SO₂ winemaking
- Unique and highly soluble autolyzed yeast that can be added to juice any time before the onset of fermentation

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.

3MH (Tropical) 3MHA (Passion Fruit) 4MMP (Goosebern
Figure 2:
Color Analysis in a 2018 Provence Rosé of
Syrah/Grenache Trial Compares Control Win

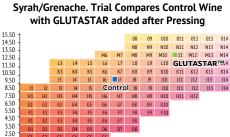
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Figure 1:

Impact of GLUTASTAR on Volatile Thiol Content

in a Sauvignon blanc at End of Fermentation

41



	AI	AZ.	A5	A4	A.	•	Ab								
			,	,	,	_	_								_
0.	50 1.	50 2	.50 3.	.50 4.	50 5	.50	6.50	7.50	8.50	9.50	10.50	11.50	12.50	13.50	14.50

Recommended Dosage	30 g/hL	2.5 lb/1000 gal
1 kg – Item #15265*	10 kg – Item #15266 *	

RESKUE



Detoxifies and treats sluggish and stuck fermentations

Nutrient Type:

Yeast Derivative Nutrient

When to Add:

Anytime during alcoholic or malolactic fermentation

Provides:

Inactivated yeast with bioadsorptive properties for compounds toxic to yeast and bacteria

YAN contribution:

Insignificant

Frequently used in sluggish or stuck fermentations (alcoholic or malolactic)

RESKUE $^{\text{m}}$ is a specific inactivated yeast that has extremely high bioadsorptive properties for compounds toxic to yeast that are often present in stuck or sluggish fermentations.

- When yeast are stressed they can produce certain short-and medium-chain fatty acids. Their presence interferes with yeast membrane sugar transport proteins, thereby interfering with sugar uptake rates and fermentation success
- RESKUE can reinvigorate sluggish or stuck alcoholic fermentations by removing these short- and medium-chain fatty acids
- RESKUE can also reinvigorate sluggish or stuck malolactic fermentations because these compounds can also be toxic to bacteria

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 (pgs 40 and 77).

 $\textbf{Storage:} \ \ \text{Dated expiration.} \ \ \text{Store in a cool and dry environment at 18°C (65°F).} \ \ \text{Once opened, keep tightly sealed and dry.}$

Recommended Dosage	30-40 g/hL	2.5-3.3 lb/1000 gal
1 kg – Item #15224*	10 kg – Item #15242*	

NOBLESSE



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

Nutrient Type:

Yeast Derivative Nutrient

When to Add:

Anytime during alcoholic or malolactic fermentation

Provides:

Polysaccharides that add a perception of sweetness and enhance mouthfeel

YAN contribution:

Insignificant

Frequently used in reds,complex whites, rosés, cider

NOBLESSE™ releases polysaccharides which help to promote harmony among mouthfeel characteristics, thereby masking sensations of acidity, astringency, or bitterness while helping to integrate alcohol and oak.

- Wines appear to have more fruit aromas and sweetness due to the contribution of low molecular weight polysaccharides
- Decrease in tannin intensity and a reduction in drying and aggressive characters due to the softening effect of high molecular weight polysaccharides
- Can be used at any time during fermentation, and although immediate results are
 possible, full integration may take three to five months
- NOBLESSE™ is a partially autolyzed yeast derivative nutrient

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.

Recommended Dosage	30 g/hL	2.5 lb/1000 gal
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2.5 kg - Item #15105*

OPTI-MUM RED



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

Nutrient Type:

Yeast Derivative Nutrient

When to Add:

Directly to grapes or at first mixing

Provides:

High molecular weight polysaccharides and oligosaccharides that contribute to color stability, volume and softness

YAN contribution:

Insignificant

Frequently used in medium-bodied reds, full-bodied reds, cool-climate reds, high maturity grapes

OPTI-MUM RED™ helps to produce wines with intense color, a rounder, softer mouthfeel, and a decreased perception of astringency.

- Early additions of OPTI-MUM RED lead to more stable color due to reactions between early-released color molecules (anthocyanins), phenolic compounds (tannins), and polysaccharides from OPTI-MUM RED
- Reduces the perception of green, astringent tannins in cool-climate or low maturity fruit
- Reduces the sensation of hotness in high alcohol wines
- The mannoprotein portion of this autolyzed yeast helps soften mouthfeel
- The yeast strain behind OPTI-MUM RED was specifically selected and fully autolyzed for its highly reactive high molecular weight polysaccharides and oligosaccharides

Usage: Mix OPTI-MUM RED in 10 times its weight of water or must 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.

Recommended Dosage	20-40 g/hL	1.7-3.3 lb/1000 gal
1 kg – Item #15229*	10 kg – Item #15250*	

OPTI-RED



For rounder and smoother tannins in reds; OMRI listed

Nutrient Type:

Yeast Derivative Nutrient

When to Add:

Anytime during alcoholic or malolactic fermentation

Provides:

High molecular weight polysaccharides early use promotes color stability and late use smooths harsh tannins

YAN contribution: Insignificant

Frequently used in light-bodied reds, medium-bodied reds

 $\mathsf{OPTI}\text{-}\mathsf{RED}^{\mathtt{TM}}$ may be used to produce wines with stable color, round mouthfeel, and smooth tannins.

- Quick release of polysaccharides that participate in color stabilizing reactions when added at the onset of fermentation
- As OPTI-RED breaks down, additional polysaccharides can complex with tannins resulting in round mouthfeel and smooth tannins
- When used in the later stages of fermentation it shapes harsh polyphenolics into smoother, more approachable tannins
- OPTI-RED is an inactivated and partially autolyzed yeast derivative

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.

Recommended Dosage	30 g/hL	2.5 lb/1000 gal
1 kg – Item #15148*	2.5 kg – Item #15138*	10 kg – Item #15211*

FRUIT & MEAD

OPTI-WHITE



Promotes roundness and smoothness and protects aromatics in whites; OMRI listed

Nutrient Type:

Yeast Derivative Nutrient

When to Add:

Anytime during alcoholic or malolactic fermentation

Provides:

Polysaccharides and antioxidant peptides that balance mouthfeel and protect aromas

YAN contribution: Insignificant

Frequently used in complex whites, rosés, cider

OPTI-WHITE™ helps to prevent oxidative browning*, stabilize and integrate flavors while bringing smoothness and complexity.

- Prepared using a specific production process that results in a yeast derivative nutrient containing both antioxidant peptides and polysaccharides
- · Protect aromatics and color (peptides) and integrates and stabilizes aroma compounds and enhances roundness (polysaccharides)
- Use at the onset of fermentation for color and aroma protection*
- Use at the tail end of fermentation for smoothness and flavor integration
- *Please note that if antioxidation is the primary goal, GLUTASTAR™ (pg 60) is a better choice

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.

Recommended Dosage	25-50 g/hL	2-4 lb/1000 gal		
1 kg – Item #15165*	2.5 kg – Item #15136*	10 kg – Item #15216*		

REDULESS



LALLEMAND OMRI

Reduces sulfur off-aromas: OMRI listed

Nutrient Type:

Yeast Derivative Nutrient

When to Add:

Anytime during alcoholic or malolactic fermentation

Provides:

Specialized inactivated yeast with membranes naturally rich in copper residues for the treatment of sulfur-off odors

YAN contribution:

Insignificant

Frequently used in reds, whites, rosés, cider

REDULESS™ is used to reduce sulfur off-odors such as H₂S, mercaptans, and some disulfides.

- Can increase fruitiness due to reduction in sulfur off-odors
- Can naturally enhance roundness
- Has also been shown to reduce vegetal and phenolic notes
- Inactivated yeast with cell walls rich in copper
- REDULESS should be removed from wine via a racking or filtration in case of the unlikely event that copper is released into the wine. Maximum copper transfer is 0.03 ppm when used at 30 g/hL

Usage: Mix REDULESS in 10 times its weight in water. Add immediately to the tank. If prepared in advance, re-suspend the product prior to its addition to the fermentor. Gently mix and rack off or filter after 72 hours. The maximum potential copper contribution when used according to the recommendation is 0.03 ppm. homogenization. This product is partially soluble. Stir to maintain suspension before and during addition.

Storage: Store at room temperature, away from direct sunlight and strong odors. Can be stored for up to four years from production date.

Recommended Dosage: Bench trials recommended	10-30 g/hL	0.8-2.5 lb/1000 gal
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1 kg - Item #15116*

2.5 kg - Item #15115*

Table 1: Measurable yeast assimilable nitrogen (YAN) needs of yeast at differ-

YAN Required for Fermentation (ppm N)

200

220

240

260

22

24

26

28

165

180

195

210

ent startina sugars

250

275

300

325

350

PROTOCOL

DEVELOP A YEAST NUTRITION PLAN

Use the following step-by-step guide to develop a complete yeast nutrition program.

1. DETERMINE HOW MUCH NITROGEN TO ADD

A Maggara SLICAD (BDIV)	° Brix	ppm	of the inic
A. Measure SUGAR (BRIX)	and YAN		of the juic

•

- B. Choose a yeast strain. Yeast strain product descriptions can be found on pgs 20-36 $\,$
- C. **Determine the chosen yeast strain's <u>NITROGEN NEED</u> low, medium, or high**. This information is listed in the product description
- D. **Determine YAN REQUIRED** for fermentation by consulting table 1

 For example: If the juice is 24 °Brix and ALCHEMY I (a medium N need strain) is selected, the fermentation will

ror example: If the Juice is 24° Brix and ALCHEMY I (a meaium in need strain) is selected, the fermentation will need 220 ppm YAN

E. If the YAN REQUIRED is higher than the JUICE YAN, then ADDITIONAL YAN is required



For example: If the YAN required for fermentation is 220 ppm and the juice has 150 ppm YAN, an additional 70 ppm YAN is required

2. MAKE NUTRITION PLAN

Using the <u>ADDITIONAL YAN</u> determined in step 1(E), consult the table below to **fill in the Nutrition Plan card** at the bottom of the page and determine what nutrient and dosage will be added at each stage of fermentation.

Stage of Winemaking	Fermentation Goal*	ADDITIONAL YAN REQUIRED							
Stage of Winemaking	rermentation Goal	0-50 ppm	0-50 ppm 51-100 ppm						
At Rehydration	All Fermentation Goals	GO-FERM STEROL FLASH - 30 g/hL							
	Fermentation Security	N/A	FERMAID O - 20 g/hL	FERMAID O - 40 g/hL					
At 2-3 °Brix Drop	Increase Varietal Aromas	STIMULA SAUVIGNON BLANC, PINOT NOIR, or SYRAH - 40 g/hL							
	Increase Fruity Esters	N/A	FERMAID O - 20 g/hL	FERMAID O - 40 g/hL					
	Fermentation Security	FERMAID O - 30 g/hL	FERMAID O - 40 g/hL	FERMAID K - 40 g/hL					
At 1/3 Sugar Depletion	Increase Varietal Aromas	FERMAID O - 10 g/hL	FERMAID O - 20 g/hL	FERMAID O - 40 g/hL					
	Increase Fruity Esters	STIMULA CHARDONNAY or CABERNET - 40 g/hL							

Dosage Nutrient At Rehydration 30 g/hL GO-FERM STEROL FLASH At 2-3 °Brix Drop g/hL At 1/3 Sugar Depletion g/hL		NUTRI	TION F	PLAN
At 2-3 °Brix Drop g/hL		Dosage		Nutrient
	At Rehydration	30	g/hL	GO-FERM STEROL FLASH
At 1/3 Sugar Depletion g/hL	At 2-3 °Brix Drop		g/hL	
	At 1/3 Sugar Depletion		g/hL	

*All fermentation nutrients help ensure healthy fermentation, but some also enhance wine aroma. STIMULA SAUVIGNON BLANC™, STIMULA PINOT NOIR™, STIMULA SYRAH™ help yeast convert varietal aroma precursors into odor-active compounds. STIMULA CHARDONNAY™ and STIMULA CABERNET™stimulate yeast to produce certain fruity esters.

ARTICLE

OXIDATIVE DAMAGE: PROCESS & PREVENTION

Oxidative damage in wine is responsible for browning, loss of varietal aroma, and bruised apple/sherry off-aromas. Ultimately these effects diminish wine quality and shorten shelf-life. Damage can occur when oxidation goes unchecked, triggering a series of reactions known as the oxidation cascade.

Damage can be prevented by disrupting the oxidation cascade. Sulfur dioxide is commonly used for this purpose, however other innovative enological tools can also be used. An understanding of the oxidation cascade is necessary to understand how all of these tools work.

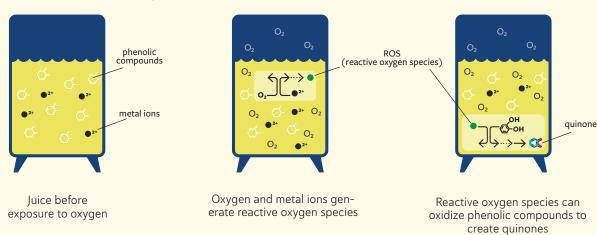
THE OXIDATION CASCADE

The process of juice and wine oxidation is often described as "the oxidation cascade" because it occurs as a string of reactions. Preventing oxidation involves limiting quinone formation and/or limiting the reactions quinones can participate in. **The oxidation cascade can be classified into two main groups of reactions**:

1. Quinone Formation - Grape phenolic compounds are converted to guinones.

Quinones can be produced from susceptible grape phenolic compounds in one of two ways: **enzymatically** or **chemically**. In the enzymatic mechanism, polyphenol oxidase enzymes (e.g., laccase and tyrosinase) convert susceptible phenols into quinones. In the chemical mechanism, oxygen reacts with transition metals like iron and copper to form radical oxygen species (highly reactive). These radical oxygen species can then oxidize susceptible phenols into quinones. The chemical mechanism is shown below:

Figure 1: Chemical Mechanism of Quinone Formation



2. Quinone Reactions - Quinones react with many compounds in juice and wine.

Quinones are highly reactive and can interact with many compounds in juice and wine (Figure 2). Some of these interactions cause oxidative damage (browning, off-aroma production, loss of varietal aroma, etc...).

- 1. Browning occurs when quinones react with susceptible polyphenols in wine, producing brown pigments which are especially visible in white and rosé wines.
- Oxidative aroma production occurs via the Strecker degradation. In this reaction, quinones and amino acids interact to form aldehydes like methional and phenylacetaldehyde which have aromas of bruised apple and sherry.
- 3. Quinones can trap aromatic thiols, resulting in a loss of wine varietal aroma.

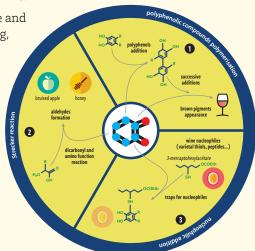


Figure 2: Quinone Reactions in Wine

PREVENTING OXIDATION

Preventing oxidation involves limiting quinone formation and/or limiting quinone reactions.

Sulfur dioxide (SO_2) is commonly used to protect must and wine from oxidation. SO_2 prevents quinone formation by inhibiting polyphenol oxidase enzymes. SO_2 also prevents quinone reactions by directly binding with the quinones and ensuring they cannot interact with other juice and wine compounds. However, SO_2 can have a negative impact on wine sensory properties and can delay the onset of malolactic fermentation. Additionally, SO_2 has been of particular concern to consumers desiring "low chemical input" wines.

Fortunately, there are several tools that can act as **alternatives to SO_2^*** in preventing oxidation including yeast derivative nutrients, tannins, and non-*Saccharomyces* yeast. These tools disrupt the oxidative cascade at different points:

GLUTASTAR™ is a yeast derivative nutrient rich in antioxidant peptides that react with quinones, limiting quinone reactions. GLUTASTAR was developed for its extreme antioxidant protection and contains a variety of antioxidant peptides including glutathione. Glutathione is a tripeptide that can exist in two forms: reduced and oxidized. Only the reduced form (glutathione sulfhydryl or GSH) can interact with quinones and prevent them from participating in other reactions. Although GLUTASTAR is rich in GSH, it is more effective than GSH alone due to its unique profile of additional antioxidant peptides.

INITIA™ is a non-Saccharomyces yeast that rapidly consumes large amounts of oxygen and lowers copper levels, thereby limiting quinone formation. INITIA, a selected strain of Metschnikowia pulcherrima, consumes large amounts of oxygen to synthesize polyunsaturated fatty acids (PUFA) necessary for its cell membrane construction. M. pulcherrima contains approximately 100 times more PUFAs than Saccharomyces yeast, and unlike Saccharomyces yeast, cannot uptake PUFAs from the environment. Synthesizing PUFAs requires a significant amount of oxygen, leaving the environment oxygen depleted.

ESSENTIAL ANTIOXIDANT™ is a tannin that scavenges metal ions and quinones and inhibits laccase, disrupting the production of quinones and limiting the reactions they can participate in.

CHOOSING ANTIOXIDANT PRODUCTS

While GLUTASTAR, INITIA, and ESSENTIAL ANTIOXIDANT all offer antioxidant protection, each have functions that differentiate them:

- GLUTASTAR* provides textural impact
- INITIA provides microbial control prior to fermentation
- ESSENTIAL ANTIOXIDANT* combats laccase due to high Botrytis loads and adds antioxidant protection during aging

*Note: These products can be used in combination to maximize antioxidant properties and lower SO_2 use throughout the winemaking process. However, these products do not completely replace the use of SO_2 – GLUTASTAR and ESSENTIAL ANTIOXIDANT do not offer antimicrobial protection, and INITIA only offers antimicrobial protection prior to fermentation.



Scott Laboratories and Lallemand Oenology have provided robust, reliable, and expertly-produced malolactic bacteria since the 1980s. Lallemand Oenology developed the MBR™ process to produce efficient and well-adapted wine bacteria which can be directly inoculated without rehydration.

Our bacteria strains rapidly convert malic acid into lactic acid and positively contribute to the wine sensory profile. They do not contain enzymes that produce biogenic amines and cannot produce precursors for ethyl phenol production by *Brettanomyces*.

The right bacteria added at the right time can help elevate your wine to the next level. Just open the packet, pour in the bacteria, and let the magic happen!



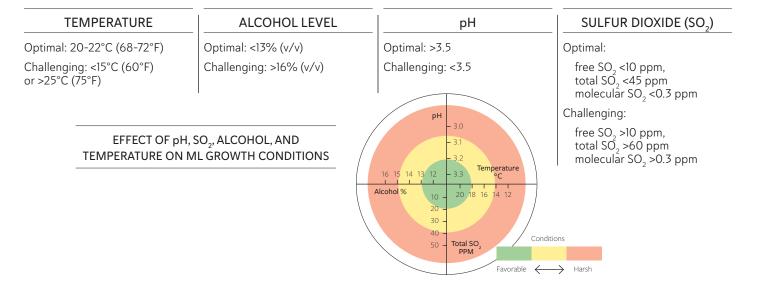
THE IMPACT OF WINE CONDITIONS ON MALOLACTIC BACTERIA

The success of malolactic fermentation (MLF) can be largely attributed to four parameters: pH, temperature, ethanol, and SO_2 . These parameters cannot be viewed independently since they have a compounding effect on the growth and metabolism of malolactic bacteria. For example, a wine with low pH and high SO_2 will be more antagonistic to bacteria than low pH alone.

Sensory contributions of bacteria are important (see bacteria descriptions on the following pages for more information). However, the selected bacteria strain must be compatible with specific wine conditions:

рН	pH affects the rate at which bacteria will consume malic acid. The optimal pH for MLF is >3.5 and when pH is lower, MLF can be inhibited. Additionally, pH impacts what forms of SO_2 are present in wine. The lower the pH, the more molecular (antimicrobial) SO_2 is present which adversely affects ML bacteria.
TEMPERATURE	Temperature impacts both the growth rate of bacteria and the malic acid degradation rate. The temperature range ML bacteria can withstand is highly influenced by alcohol concentration. The higher the alcohol in the wine, the lower the MLF temperature should be. The ideal temperature (during sequential inoculation) is 20° C (68° F). Temperatures more than 25° C (77° F) can be lethal, while temperatures < 10° C (50° F) can inhibit MLF.
ALCOHOL LEVEL	Just like with yeast, ethanol can destabilize the bacteria cell membrane and bacteria strains vary in their ability to tolerate ethanol. Ensure the chosen bacteria strain can tolerate the alcohol content of the wine.
SULFUR DIOXIDE (SO ₂)	In all forms, SO_2 can be problematic to malolactic bacteria. It is antimicrobial, especially at lower pHs, and can cause varying levels of damage to bacteria, up to and including cell death. Free SO_2 is inhibitory to bacteria, but bound SO_2 is also a problem. SO_2 can be loosely bound to acetaldehyde which bacteria can consume, thereby releasing and increasing free SO_2 . For that reason, it is always important to measure both free and total SO_2 prior to adding bacteria. Different bacteria strains have different tolerances to SO_2 , though optimal conditions are: free SO_2 <10 ppm, total SO_2 <45 ppm, and molecular SO_2 <0.3 ppm.

OPTIMAL AND CHALLENGING CONDITIONS FOR MALOLACTIC BACTERIA



QUICK GUIDE TO CHOOSING MALOLACTIC BACTERIA

		BETA CO-INOC	АГРНА	ВЕТА	ELIOS 1	LALVIN MBR 31	O-MEGA	PN4	SILKA	SOLO SELECT	VP41	MALOTABS
	Pg#	69	70	70	71	71	72	72	73	73	74	74
Alcohol tolerance (% v/v)	<15.0	<15.5	<15.0	<14.0	<14.0	<16.0	<15.5	<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 (ppm)		<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	High	Low	Med	Med	Med	Low	Low
Typical fermentation	Start	Slow	Fast	Slow	Mod	Slow	Fast	Mod	Mod	Mod	Fast	Fast
kinetics	Finish	Fast	Slow	Fast	Fast	Fast	Fast	Fast	Mod	Mod	Fast	Mod
Reds		٠	٠	٠	٠	٠	٠	٠	٠	٠	٠	•
Whites		٠	٠	٠		٠	٠	٠			٠	•
Rosés		٠	٠				٠				٠	•
Fruit Wines						٨	٠					
Compatible with Yeast Co	o-Inoculation	٨										
Restart Sluggish or Stuck	MLF										•	
Diacetyl (buttery) Produc	ction		٠	٠		٠		٠				
Enhances Freshness							٨					
Enhances Fruitiness		٠		٠		٠	٨			٠	٠	٠
Enhances Mouthfeel			•			•		٠	•		•	•
Enhances Spiciness					•			٠		•		
Enhances Structure					•			•		•		
Minimizes Herbaceousne	PSS		•		•			•				

MALOLACTIC BACTERIA & NUTRIENTS

Bacteria for Co-Inoculation

Malolactic bacteria can be inoculated just after yeast so that the alcoholic and malolactic fermentation (MLF) occur simultaneously. This co-fermentation is referred to as **co-inoculation**. Alternatively, malolactic bacteria can be added towards the end or after alcoholic fermentation. This is referred to as **sequential inoculation**.

Co-inoculating bacteria with yeast has many benefits. Malolactic bacteria growth conditions are more favorable during alcoholic fermentation due to warmer temperatures, lack of alcohol, and better nutrient availability. Co-inoculation also results in wines that are fresh and fruity with very little diacetyl (butter) character.

When co-inoculating, the following practices are advised:

- Choose an ML-compatible yeast strain for the alcoholic fermentation (see pgs 14-17)
- Use BETA CO-INOC $^{\text{\tiny TM}}$ as the malolactic bacteria strain
- Monitor both °Brix and malic acid depletion during alcoholic fermentation
- Manage the alcoholic fermentation temperature
 - » At inoculation temperature should not exceed 25°C (78°F)
 - » Alcohol <6% temperature should not exceed 35°C (95°F)
 - » Alcohol >6 10 % temperature should not exceed 28°C (82°F)
 - » Alcohol >10 12 % temperature should not exceed 26°C (79°F)
 - » Alcohol >12 % temperature should be less than 24°C (75°F)
 - » Alcohol >14.5 % temperature should be less than <21°C (70°F)

These best practices are advised because *Oenococcus oeni* (malolactic bacteria) can consume glucose (sugar) and produce acetic acid (VA). However, BETA CO-INOCTM will only do this *after* malolactic fermentation is complete (all malic acid has been consumed). If malolactic fermentation finishes before alcoholic fermentation, add BACTILESSTM (pg 132) or lysozyme (pg 131) to inhibit the bacteria and prevent VA production.

BETA CO-INOC



Co-inoculation strain for fresh and fruit-forward wines

Alcohol Tolerance: <15%
pH:
>3.2
Total SO ₂ at crush:
<60 ppm
Temp:
<82°F once alcohol >5% (v/v)

Frequently used in fresh and fruity white, rosé, and red wines

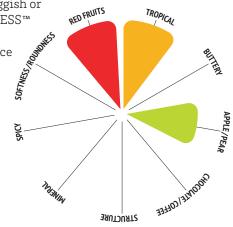
BETA CO-INOC™ is recommended for fresh, fruit-forward wines. This strain was specifically selected by Lallemand Oenology for reliable malic acid consumption, low diacetyl (buttery aromas), and low VA production.

- · Slow to start but finishes fast
- Co-inoculation results in faster completion of malolactic fermentation compared to sequential inoculation, meaning wines can be stabilized quicker
- Add BETA CO-INOC 24-48 hours post yeast inoculation. Not recommended for use in a sequential MLF
- Recommended temperature at inoculation is between $18-25^{\circ}\text{C}$ (64-77°F) and recommended ongoing temperatures are between $14-28^{\circ}\text{C}$ (57-82°F)
- *Oenococcus oeni* strain isolated from the Abruzzo region of Italy

PRO-TIP: If alcoholic fermentation is sluggish or stuck, it may be necessary to add BACTILESS™ (pg 132) or DELVOZYME (pg 131) so that bacteria do not consume sugar and produce VA. This is especially important if the pH is >3.5.

Usage: Add directly to pH > 3.2 juice/must 24–48 hours after yeast inoculation and before alcohol reaches 5% (v/v). Once added, mix thoroughly. **Storage:** Dated expiration. For short term (<18 months) store at 4° C (39°F). For long term (>18 months) store at -18° C (0°F).

25 hL (660 gal) dose – Item #15617* 250 hL (6600 gal) dose – Item #15618*



Bacteria for Sequential Inoculation

ALPHA



Robust and versatile strain for aroma complexity and mouthfeel enhancement

Alcohol Tolerance: <15.5%
pH: >3.2
Total SO ₂ : <50 ppm
Temp: >57°F

Frequently used in all styles of whites, rosés, reds

ENOFERM ALPHA™ can efficiently conduct malolactic fermentation at cooler temperatures and positively contribute to wine aroma, complexity, and mouthfeel.

- White wines have increased levels of pear, apricot, and pineapple aromas
- Red wines have berry, cherry, and plum aromas with decreased green and vegetative characters
- Shows good resistance to fungicides

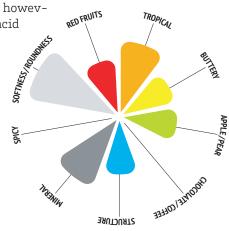
Selected for its high survival rate, dominance during malolactic fermentation, and reliability; however, it is sensitive to high levels of lactic acid (>1.5 g/L) and should not be used when

(>1.5 g/L) and should not be used when malic acid is >4 g/L if a complete MLF is desired

 Oenococcus oeni isolated by the Institut Français de la Vigne et du Vin (IFV), Burgundy, France

Usage: Add directly to wine and mix thoroughly. **Storage:** Dated expiration. For short term (<18 months) store at 4° C (39°F). For long term (>18 months) store at -18° C (0°F).

2.5 hL (66 gal) dose – Item #15601* 25 hL (660 gal) dose – Item #15602* 250 hL (6,600 gal) dose – Item #15603*



BETA



Diacetyl production and enhanced varietal aroma

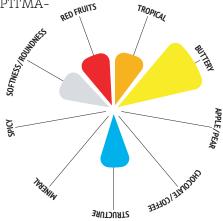
Alcohol Tolerance: <15%
pH: >3.2
Total SO ₂ : <60 ppm
Temp: >57°F

Frequently used in Chardonnay, Merlot, Syrah, other medium-bodied red wines with high aromatic potential ENOFERM BETATM preserves and enhances varietal aromas, increases volume and softness, and can impact the diacetyl levels of wines. It is called BETA due to its production of the fruity and floral compounds β -damascenone and β -ionone.

- Produces buttery aromas and flavors in white wines. If the wine is left on the lees, the buttery notes are decreased and tropical fruit aromas like pineapple and mango are revealed
- Supports tannin structure and red fruit, berry, and floral notes in red wines
- BETA is a high nutrient-demanding strain and benefits from the addition of either ACTI-ML™, OPTI'MA-LO BLANC™ or ML RED BOOST™ (pg 75)
- Selected for its robustness and ability to enhance aromas while respecting grape varietal characteristics
- *Oenococcus oeni* isolated from the Abruzzo region of Italy

Usage: Add directly to wine and mix thoroughly. Storage: Dated expiration. For short term (<18 months) store at 4°C (39°F). For long term (>18 months) store at -18°C (0°F).

2.5 hL (66 gal) dose – Item #15604* 25 hL (660 gal) dose – Item #15605* 250 hL (6,600 gal) dose – Item #15606*



NUTRIENTS

ELIOS 1



Enhanced fresh fruit, spice, and tannin integration

Alcohol Tolerance*: <14%
pH: >3.4
Total SO ₂ : <50 ppm
Temp: >64°F

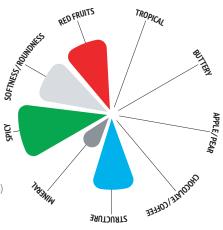
Frequently used in medium-bodied reds, full-bodied reds

LALVIN ELIOS 1^{TM} is best suited for Mediterranean, Rhône style, and other warm climate red wines where it is known for enhancing red fruit aromas, spice, and tannin intensity.

- Wines have an integrated mouthfeel with good mid-palate intensity, decreased drying sensations, and increased freshness
- Can reduce the perception of green and vegetative characters
- Selected due to its fast implantation and reliable malic acid degradation
- Has a high capacity for acetaldehyde degradation. Because acetaldehyde strongly binds SO₂, using ELIOS 1 may help keep more SO₂ in the free form and therefore make post-MLF SO₂ additions more effective
- Oenococcus oeni isolated by the Institut Coopératif du Vin (ICV), France

Usage: Add directly to wine and mix thoroughly. Storage: Dated expiration. For short term (<18 months) store at 4°C (39°F). For long term (>18 months) store at −18°C (0°F).

25 hL (660 gal) dose – Item #15108* 250 hL (6,600 gal) dose – Item #15109*



LALVIN (MBR) 31



Balanced sensory profile and color stability in low pH wine and low temperature conditions

The state of the s
Alcohol Tolerance:
<14%
pH:
>3.1
Total SO ₂ :
<45 ppm
Temp:
>55°F

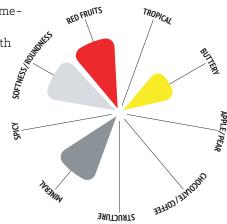
Frequently used in aromatic whites, light-bodied reds, medium-bodied reds, fruit wines

LALVIN 31^{m} is suitable for cool climate wines as it can enhance varietal characters, fruit flavors and promote color stability. Wines made using LALVIN 31 have good body and length.

- In white wines, it adds complexity due to its light buttery flavor. With lees contact the buttery notes decrease, elevating fruit flavors and mineral notes
- In red wines, dark berry fruit flavors, color stability, and mouthfeel are increased
- Tolerant of high levels of lactic acid (from high starting malic acid levels) that can be inhibitory to other ML strains
- Selected for its capacity to achieve malolactic fermentation in low pH and low temperature situations
- Due to its high nutrient demand, it is sometimes slow to start but finishes quickly, especially when used in conjunction with OPTI'MALO BLANC™ or ML RED BOOST™ (pg 75)
- Oenococcus oeni isolated by the Institut du Français de la Vigne et du Vin (IFV), France

Usage: Add directly to wine and mix thoroughly. **Storage:** Dated expiration. For short term (<18 months) store at 4° C (39°F). For long term (>18 months) store at -18° C (0°F).

2.5 hL (66 gal) dose – Item #15022* 25 hL (660 gal) dose – Item #15032* 250 hL (6,600 gal) dose – Item #15127*



^{*}Alcohol tolerance of ELIOS 1 is improved (up to 15.5%) when the pH >3.5 and TSO2 <35 ppm

O-MEGA



Strong fermenter for freshness and fruit expression

Alcohol Tolerance: <16%
pH: >3.1
Total SO ₂ : <60 ppm
Temp: >57°F

Frequently used in overripe, full-bodied red and white wines, cool-climate Pinot noir and Syrah, rosés, fruit wines

 $O-MEGA^{TM}$ is the most robust strain in Scott Laboratories' portfolio. It is highly suitable for conducting malolactic fermentation in high alcohol, low temperature, or low pH situations. O-MEGA lends balance and complements aromas by bringing freshness; however, it is not recommended for wines with herbaceous or vegetative notes, as these will be amplified.

- · Contributes to freshness and mineral/citrus notes in white wines
- In red wines, notes of red and dark berries like redcurrant, strawberry, blackcurrant, and blackberry are increased
- Selected for its ability to complete MLF even under challenging wine conditions of high alcohol, low pH, and low temperatures

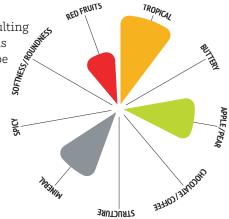
• May help stabilize color due to its slow degradation of acetaldehyde

Has a late degradation of citric acid resulting in very low diacetyl and VA levels, and is tolerant to levels of lactic acid that can be inhibitory to other ML strains

 Oenococcus oeni isolated in the south of France by the Institut du Français de la Vigne et du Vin (IFV) in Burgundy

Usage: Add directly to wine and mix thoroughly. **Storage:** Dated expiration. For short term (<18 months) store at 4° C (39°F). For long term (>18 months) store at -18° C (0°F).

25hL (660 gal) dose – Item #15615* 250hL (6,600 gal) dose – Item #15616*



PN4



Fast fermenter for enhanced spice, fruit, and mouthfeel

Alcohol Tolerance: <15.5%
pH: >3.1
Total SO ₂ : <60 ppm
Temp: >61°F

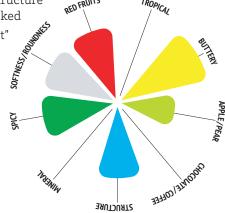
Frequently used in complex whites, big and spicy reds

 $PN4^{TM}$ is equally suited to red and white winemaking where it contributes to aromatic complexity, mouthfeel, and balance.

- Varietal expression is increased in tank-fermented white wines with minimal lees contact
- Barrel-fermented white wines show notes of honey and butter (diacetyl), full and creamy mouthfeel, and well-integrated oak character
- Red wines are described as having increased spiciness with elevated notes of nutmeg, licorice, and pepper. General fruit notes of plum, cherry, and berry are increased, structure is enhanced, and herbaceousness is masked
- It is affectionately known as "The Rocket" for its fast fermentation kinetics under difficult winemaking conditions
- Oenococcus oeni isolated by the Institute of San Michele in the Trentino region of Italy

Usage: Add directly to wine and mix thoroughly. **Storage:** Dated expiration. For short term (<18 months) store at 4° C (39°F). For long term (>18 months) store at -18° C (0°F).

25 hL (660 gal) dose – Item #15607* 250 hL (6,600 gal) dose – Item #15608*



NUTRIENTS

SILKA

LALLEMAND

Silky mouthfeel, aromatic balance, and good oak integration

Alcohol Tolerance: <16%
pH: >3.3
Total SO ₂ : <60 ppm
Temp: >59°F

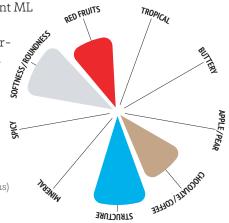
Frequently used in medium and full-bodied red wines that are fermented or aged in oak

LALVIN SILKA $^{\text{m}}$ is recognized for its positive impact on aromas and mouthfeel as it can minimize astringency and bitterness, quickly integrates tannins, and masks herbaceous and green flavors, resulting in well-balanced red wines.

- Accentuates aromas of chocolate, vanilla, and toasted oak, balanced by aromas and flavors of red currant, blackberry, and cherry
- SILKA has a moderate nutrient demand and benefits from the malolactic fermentation nutrient ML RED BOOST™ (pg 75)
- Selected for its unique sensory characteristics, steady fermentation kinetics, and tolerance of challenging winemaking environments
- Oenococcus oeni isolated in La Rioja, Spain and selected by the Instituto de Ciencias de la Vid y del Vino (ICVV)

Usage: Add directly to wine and mix thoroughly. **Storage:** Dated expiration. For short term (<18 months) store at 4° C (39°F). For long term (>18 months) store at -18° C (0°F).

25 hL (660 gal) dose - Item #15624 *



SOLO SELECT



Alcohol Tolerance: <16%
pH: >3.2
Total SO ₂ : <50 ppm
Temp: >57°F

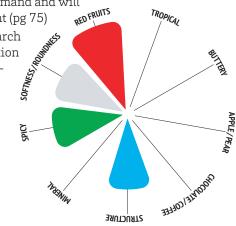
Frequently used in Syrah, Zinfandel, medium-bodied reds, full-bodied reds

SOLO SELECT is known to enhance dark fruit and spicy notes, structure, and complexity in medium and full-bodied red wines. While most malolactic bacteria strains are isolated in Europe, SOLO SELECT was isolated from the Yarra Valley,

- Late degradation of citric acid resulting in low levels of diacetyl and volatile acidity
- This strain has a moderate nutrient demand and will benefit from ML RED BOOST™ nutrient (pg 75)
- Selected by the Australian Wine Research Institute (AWRI) for its good implantation rates and efficient fermentation kinetics, even in challenging conditions
- Oenococcus oeni isolated in the Yarra Valley, Australia

Usage: Add directly to wine and mix thoroughly. **Storage:** Dated expiration. For short term (<18 months) store at 4°C (39°F). For long term (>18 months) store at -18°C (0°F).

25 hL (660 gal) dose – Item #15270*



VP41

LALLEMAND

All-purpose strain for enhanced complexity and mouthfeel

Alcohol Tolerance: <16%
pH: >3.1
Total SO ₂ : <60 ppm
Temp: >61°F

Frequently used in reds, whites, rosés, restarting stuck fermentations

LALVIN VP41 $^{\text{m}}$ is a flexible and adaptable strain that is appreciated for its ability to enhance aromatic complexity, richness, and mouthfeel in different styles of red, white, and rosé wines.

- White wines have elevated tropical fruit flavors, apple and pear notes, and very low levels of diacetyl
- Rosé wine aromas are respected and adaptable based on varietal and fermentation aromas
- Red wines have increased currant and berry flavors and aromas, with enhanced coffee and chocolate notes and sweet tannins
- Recommended strain for restarting stuck malolactic fermentations (see pg 77)

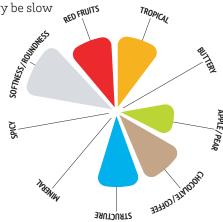
 At temperatures below 16°C (61°F) it may be slow to start but can complete MLF
 Selected for its strong implantation rate,

 Selected for its strong implantation rate steady fermentation kinetics, high alcohol tolerance, enhanced mouthfeel, and ability to improve wine structure

· Oenococcus oeni isolated in Italy

Usage: Add directly to wine and mix thoroughly. **Storage:** Dated expiration. For short term (<18 months) store at 4° C (39°F). For long term (>18 months) store at -18° C (0°F).

2.5 hL (66 gal) dose – Item #15048* 25 hL (660 gal) dose – Item #15042* 250 hL (6,600 gal) dose – Item #15044*



MALOTABS



Oenococcus oeni in tablet form for easy barrel additions

Alcohol Tolerance: <16%
pH: >3.2
Total SO ₂ : <60 ppm
Temp: >61°F

Frequently used in reds, whites, rosés

MALOTABS™ are an innovative and easy-to-use tablet form of malolactic bacteria designed by Lallemand Oenology for direct addition into barrels. MALOTABS dissolve immediately upon addition to the barrel and are self-dispersed throughout the wine, eliminating the need for mixing during the early stages of malolactic fermentation.

- · Wines show increased fruit, mouthfeel, balance, and structure
- MALOTABS are produced from a known ML strain developed for good implantation, moderate to fast kinetics, and low volatile acid and diacetyl production

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.

Storage: Dated expiration. For short term (<18 months) store at 4°C (39°F). For long term (>18 months) store at -18°C (0°F).

Box of five 2.5 hL (66 gal) doses - Item #15049*

Nutrients for Bacteria

ACTI-ML



Bacteria rehydration nutrient

Recomme	ended Dosage:	
20 g/hL	50 g/60 gal	1.7 lb/1000 gal

ACTI- ML^m is a bacteria nutrient used during rehydration to strengthen the bacteria population, especially when wine conditions are difficult.

- Specialized nutrient blend of inactivated yeast rich in amino acids, minerals, and vitamins
- Mixed with cellulose to provide more surface area helping to keep bacteria in suspension
- Developed by the Lallemand Oenology Bacteria R&D team led by Dr. Sibylle Krieger-Weber

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.

1 kg - Item #15681*

ML RED BOOST



Malolactic nutrient for red wines and any stuck malolactic fermentations. OMRI listed

20 g/hL 50 g/60 gal 1.7 lb/1000 gal	Recomme	ended Dosage:	
20 g/11L 20 g/00 gai 1.7 lb/1000 gai	20 g/hL	50 g/60 gal	1.7 lb/1000 gal

ML RED BOOST $^{\text{TM}}$ is an advanced bacteria nutrient that compensates for nutrient deficiencies and improves the survival rate and resistance of bacteria to the inhibitory effects of polyphenolic compounds in red wines.

- Provides essential amino acids, peptides, polysaccharides, and minerals from specific inactivated yeast
- · Results in healthier ML bacteria and shorter malolactic fermentations
 - ML RED BOOST is highly recommended for restarting sluggish and stuck malolactic fermentations (see protocol on pg 77)

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.

1 kg - Item #15218*

OPTI'MALO BLANC



Malolactic nutrient for white and rosé malolactic fermentations; OMRI listed

Recomme	ended Dosage:	
20 g/hL	50 g/60 gal	1.7 lb/1000 gal

OPTI'MALO BLANC $^{\text{TM}}$ is a unique malolactic nutrient specifically formulated to help overcome the challenges of malolactic fermentation in white and rosé wines by compensating for nutritional deficiencies, stimulating the growth and malic acid metabolism of the bacteria, and decreasing MLF duration, allowing wines to be stabilized more quickly.

- Provides essential amino acids, desirable peptides, polysaccharides, and minerals from specific inactivated yeast
- Results in healthier ML bacteria and shorter malolactic fermentations

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.

1 kg - Item #15217*

OPTI'MALO PLUS



General malolactic fermentation nutrient

 Recommended Dosage:

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

OPTI'MALO PLUS™ is a general-purpose malolactic fermentation (MLF) nutrient that supports malolactic bacteria resulting in a faster start to malolactic fermentation.

- Blend of inactivated yeasts rich in amino acids, minerals, vitamins, cell wall polysaccharides and cellulose
- Higher bacteria survival rate and shorter malolactic fermentation
- ML RED BOOST™ is the preferred MLF nutrient over OPTI'MALO PLUS for red wines and OPTI'MALO BLANC™ is preferred for white and rosé wines

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.

1 kg – Item #15141*

ARTICLE TROUBLESHOOTING GUIDE FOR SLUGGISH MALOLACTIC FERMENTATIONS

There are many factors that can influence the success of a malolactic fermentation (MLF). Before jumping into a full restart, it is a good idea to assess each of these factors. Sometimes only a small adjustment is needed to help an MLF complete successfully. Use the guide below to evaluate the potential causes and solutions.

STEP 1: Determine if wine conditions are antagonistic to bacteria:

As discussed on pg 67, malolactic fermentation (MLF) is affected by wine conditions. When MLF becomes stuck or sluggish, the first step is to evaluate whether wine conditions are problematic:

TEMPERATURE MIGHT BE TOO LOW

Low temperature is the most common reason for slow and stuck MLF. Cellar temperatures are often significantly lower than the optimal range for ML bacteria. Try warming the tank or barrels to 18-20°C (64-68°F).

ALCOHOL MAY BE TOO HIGH

If the wine alcohol level is higher than the tolerance of the bacteria, restart may be necessary using a strain with a higher alcohol tolerance. See pg 77 for restart instructions.

pH MAY BE TOO LOW

If the wine pH is lower than the tolerance of the bacteria, a restart will be necessary using a pH-compatible strain. See pg 77 for restart instructions.

SO, MAY BE TOO HIGH

Even if little or no SO₂ has been added, it may still be present during MLF. SO₂ can come from several sources including yeast, old barrels, and/or erroneous cellar additions.

If total SO₂ (TSO₂) has exceeded the tolerance of the bacteria strain, the wine should be reinoculated with a strain that has a higher TSO, tolerance (see pg 77 for restart instructions). TSO2 may also be lowered via blending.

MALIC AND LACTIC ACID MAY BE TOO HIGH

Lactic acid >1.5 g/L can slow MLF and levels >3 g/L can inhibit MLF. If initial malic acid >7.0 g/L, an inhibitory amount of lactic acid may be produced from the malolactic conversion and a complete MLF may not be possible without blending or other corrective actions.

STEP 2: If wine conditions are not antagonistic (or have been adjusted), consider the following:

THE BACTERIA MIGHT BE STRUGGLING TO STAY IN SUSPENSION

If the wine has low turbidity, bacteria may struggle to stay in suspension. Try stirring tanks or barrels more frequently.

THE WINE MIGHT BE LACKING NUTRIENTS

Malolactic bacteria have specific nutrient needs, but there are no easy/cost-effective analyses that can help determine deficiencies in wine. ML bacteria require organic acids (malic, citric, pyruvic), organic nitrogen (amino acids, peptides), vitamins (B group), trace minerals (Mn, Mg, K, Na), and low levbacteria may not consume malic acid.

Malolactic nutrients can compensate for deficiencies. As it is difficult to determine whether a wine is deficient, we recommend using them preventatively or intervening with a nutrient add within 7 days of inoculation if MLF has not started (and temperature is not problematic). Adding a malolactic nutrient is not as critical if bacteria is co-inoculated with yeast.

THE WINE MIGHT NEED A DETOX

If you have already added ML nutrients, the bacteria should have what it needs. Sometimes toxins can be present that inhibit 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 pg 60).

THERE MAY NOT BE ENOUGH BACTERIA

If you did not inoculate with Oenococcus oeni, there may not be enough healthy bacteria to complete MLF. In order for MLF els of sugar (fructose, glucose). If any nutrients are deficient, to begin, there must be 1 million cells per mL (and native strains may not be able to achieve this population). Consider inoculating with a commercial strain and see pgs 67-68 for advice on choosing bacteria.

IT MIGHT JUST NEED MORE TIME

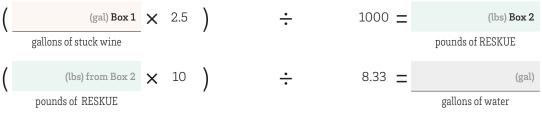
MLF can be a test of patience taking weeks, or even months, to complete. To determine if MLF is complete, malic acid must be measured — it is nearly impossible to determine completion by sensory analysis – and is considered complete when malic acid is ≤ 0.1 g/L (some say ≤ 0.2 g/L).

PROTOCOL RESTART A STUCK MALOLACTIC FERMENTATION USING VP41

PREPARE THE STUCK WINE

Step 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 at $30-37^{\circ}$ C ($86-98^{\circ}$ F) (see pg 60 for more about RESKUE). Wait 20 minutes then add to stuck wine.





Step 2: Allow RESKUE to settle for 48 hours then rack off the settled lees.



Step 3: Adjust temperature of RESKUE-treated wine to 18–22°C (64–72°F).



MALOLACTIC BACTERIA NUTRIENT ADDITION

Step 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.



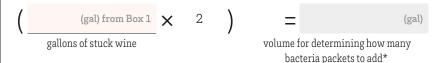
Step 5: Mix gently and wait 24 hours before bacteria addition.



MALOLACTIC BACTERIA ADDITION

Step 6: Add a double dose of LALVIN VP41™ and mix to homogenize. To determine how many packets of bacteria to add: double the volume of stuck wine. Then, add enough bacteria packets to treat that volume*.





*VP41 is sold in packets that treat 66 gal, 660 gal, or 6600 gal. Use any combination of packets that best approximates the volume calculated above

Step 7: Check for MLF activity by analyzing L-malic acid degradation every 2–4 days.



FRUIT & MEAD

ARTICLE

MALOLACTIC FERMENTATION FEASIBILITY EVALUATION

AVOIDING STUCK MALOLACTIC FERMENTATIONS

As previously mentioned, the factors that influence malolactic fermentation (MLF) have compounding effects on one another and cannot be looked at individually. For example, a wine with low pH and high SO, will be more antagonistic to bacteria than low pH alone. The following feasibility evaluation was created to help practically represent this phenomenon.

The scorecard rates how antagonistic several wine conditions are to ML bacteria and returns a total point value representing the predicted difficulty of MLF. Based on this value, Scott Laboratories recommends certain steps be taken to maximize success. This evaluation is most helpful if conducted prior to MLF but can still be helpful to provide context if a stuck MLF occurs.

ML BACTERIA FEASIBILITY EVALUATION

Use this scorecard to give a score to your wine for each listed attribute. Add up the point values for each attribute for a total score and evaluate predicted difficulty of fermentation based on the scorecard below.

WINE CONDITIONS	1 POINT	2 POINTS	8 POINTS	10 POINTS
Alcohol (%v/v)	<13	13-15	15-17	>17
рН	>3.4	3.1-3.4	2.9-3.1	<2.9
Free SO ₂ (ppm)	<8	8-12	12-15	>15
Total SO ₂ (ppm)	<30	30-40	40-60	>60
Temperature	64-72°F (18-22°C)	57-64 or 72-75°F (14-18 or 22-24°C)	50-57 or 75-84°F (10-14 or 24-29°C)	<50 or >84°F <10 or >29°C
Yeast Nutritional Requirements	Low	Medium	High	Very High
Ease of Alcoholic Fermentation	No problems	Transient yeast stress	Sluggish or stuck AF	Prolonged yeast contact
Initial Level of Malic Acid (g/L)	2-4	4-5 or 1-2	5-7 or 0.5-1	>7 and <0.5
Maximum Rate of Alcoholic Fermentation (maximum loss of Brix/day)	<2	2-4	4-6	>6

Note: Other factors that are currently less well understood may include the level of dissolved oxygen content, polyphenolic content, lees compacting, pesticide residue, etc.

TOTAL SCORE:

EASY	MODERATE	DIFFICULT	EXTREME
<13	13-22	23-40	>40
Choose a bacteria strain compatible with the wine conditions and sensory goals. Ensure temperature is between 14-24°C (57-75°F).	Choose a bacteria strain compatible with the wine conditions and sensory goals. Conduct MLF at 20°C (68°F).	Choose a bacteria strain compatible with the wine conditions and sensory goals. Use a malolactic nutrient and conduct MLF at 20°C (68°F).	Consider adjusting wine conditions before inoculating with bacteria. This may include deacidification, reducing alcohol, detoxifying using RESKUE, and warming the temperature to 20°C (68°F). Consult a technical representative for additional advice.

CHECK OUT OUR WINE STYLE GUIDES

Winemakers can drive wine style based on key processing decisions and product choices. We created these Scott Labs wine style guides to provide both process and product recommendations for helping winemakers achieve their stylistic goals.



Chardonnay Wine Style Guide scottlab.com/chardonnay



Rhône White Wine Style Guide scottlab.com/rhone



Medium Bodied Red Wine Style Guide scottlab.com/medium-red



Rosé Wine Style Guide scottlab.com/rose



Sauvignon blanc Wine Style Guide scottlab.com/sauvignon-blanc



Full Bodied Red Wine Style Guide scottlab.com/full-red



Aromatic White Wine Style Guide scottlab.com/aromatic-white



Light Bodied Red Wine Style Guide scottlab.com/light-red



Oak

Scott Laboratories believes that oak infusion products are a valuable tool for wineries looking to improve sustainability and reduce production costs. In addition to our own innovative THERMIC line, we have partnered with StaVin, one of the world's leading suppliers of oak infusion products. StaVin's traditional and convection toasted French oak expands our existing portfolio to provide a broader range of oak flavors and aromas.

Tannins

Scott Laboratories likes clever solutions for common problems. Tannins are one of our favorite winemaking tools due to their versatility. They can be added at any stage of the winemaking process to contribute to mouthfeel, structure, and aroma. Their impact happens relatively quickly, and often a small addition can create big results. Scott Laboratories' tannins may become one of



BENEFITS OF OAK & TANNINS

Oak infusion products and tannins are flexible tools that can be used in all stages of winemaking to achieve a variety of goals. These products can increase fruit expression, contribute oak characters, minimize greenness, and enhance mouthfeel.

Additionally, some tannins can act as antioxidants by disrupting the oxidation cascade and inhibiting damaging enzymes from *Botrytis* infection. Use of oak and tannins in aging and finishing are especially useful in wines that lack structure, complexity, and balance. **Choosing the right oak infusion product or tannin depends on the winemaking goal**:

STRUCTURE & BALANCE	Oak chips, tannins, and oak infusion products can build structure, build volume, or reduce astringency and bitterness. The most appropriate product will depend on winemaking stage.	
AROMA	Both oak infusion products and tannins can enhance wine aroma. Tannins can enhance freshness and fruit aromas, add oak aromas (depending on tannin source), and mask undesired green/herbaceous characters. Oak infusion products can contribute positive aromas associated with barrel aging and can also minimize green/herbaceous aromas.	
ANTIOXIDATION	Tannins can act as antioxidants (protecting wine aroma and preventing browning) by scavenging many compounds involved in the oxidation cascade (for more information see pgs 64–65). Some tannins can even inactivate laccase, an enzyme present in grapes affected by <i>Botrytis</i> and other rot that leads to accelerated wine oxidation.	
COLOR STABILITY	Fermentation tannins , which are generally a mix of condensed and hydrolyzable tannins, can contribute to color stability by forming complexes with anthocyanins.	



QUICK GUIDE TO CHOOSING OAK & TANNINS

WINEMAKING STAGE	WINE TYPE	GOAL	SUGGESTED TANNIN	SUGGESTED OAK	
gr ss	Red, White, Rosé	Minimize Botrytis damage	ESSENTIAL ANTIOXIDANT, FT BLANC, FT ROUGE		
Incoming grapes and in press	White, Rosé	Limit oxidation	FT BLANC, FT BLANC SOFT, FT BLANC CITRUS, ESSENTIAL ANTIOXIDANT		
gra	White, Rosé	Increase citrus aromas and flavors	FT BLANC CITRUS		
	Red	Increase berry aromas and flavors	FT ROUGE BERRY		
or H	White, Rosé	Limit oxidation	ESSENTIAL ANTIOXIDANT, FT BLANC, FT BLANC SOFT, FT BLANC CITRUS		
Juice or Must	Red, Rosé	Increase berry aromas and flavors	FT ROUGE BERRY, FT ROUGE		
ul a	Red	Limit oxidation, minimize greenness & stabilize color	FT ROUGE, FT ROUGE SOFT, UVA'TAN	FEELWOOD! Balance & Structure or Sweet & Fresh	
	White, Rosé	Enhance freshness	FT BLANC CITRUS	FEELWOOD! Sweet & Fresh	
	Red, White, Rosé	Increase fruit expression	FT BLANC CITRUS, FT ROUGE BERRY	FEELWOOD! Balance & Structure or Sweet & Fresh, any THERMIC or	
uo	White, Red	Add oak texture, flavors and aromas		NEW StaVin format	
Fermentation	Red	Minimize greenness	FT ROUGE SOFT, FT ROUGE, FT ROUGE BERRY	FEELWOOD! Balance & Structure, any THERMIC or NEW StaVin format	
Ferm	Red, White, Rosé	Add mid-palate	FT ROUGE, FT BLANC SOFT, UVA'TAN SOFT	FEELWOOD! Sweet & Fresh,any THERMIC or Stavin format	
	Red, White, Rosé	Build structure	FT BLANC, FT BLANC SOFT, FT ROUGE, UVA'TAN	FEELWOOD! Balance & Structure,any THERMIC or NEW StaVin format	
	Red	Color stability	FT ROUGE, FT COLORMAX, UVA'TAN		
	Red, White	Limit oxidation	ESSENTIAL ANTIOXIDANT, ESTATE, FT BLANC		
	White, Rosé	Increase citrus aromas, flavors and freshness	FT BLANC CITRUS		
	Red, Rosé	Increase berry aromas and flavors	ESTATE, FT ROUGE BERRY		
bu Bu	White, Red	Increase oak flavors and aromas			
Aging	Red	Minimize greenness	FT ROUGE BERRY		
	Red	Enhance mid-palate	ESTATE	Any THERMIC or NEW StaVin format	
	Red, White, Rosé	Soften mouthfeel	FT BLANC SOFT, UVA'TAN SOFT		
	Red, White, Rosé	Build structure	ESTATE, FT BLANC SOFT, UVA'TAN		
ing)	White, Rosé	Enhance citrus aromas and freshness	FT BLANC CITRUS, FT BLANC, ESSENTIAL ANTI OXIDANT		
bottl	Red, White, Rosé	Increase fruit expression	FT BLANC CITRUS, FT ROUGE BERRY		
shing	Red, White, Rosé	Increase oak flavors and aromas and sweetness perception	RICHE, RICHE EXTRA	THERMIC oak cubes,	
Finishing (3-6 weeks before bottling)	Red, White, Rosé	Enhance mid-palate	FT BLANC SOFT, FT ROUGE BERRY, RICHE, RICHE EXTRA	StaVin oak segments,	
-6 we	Red, White, Rosé	Soften mouthfeel	FT BLANC SOFT, RICHE EXTRA, UVA'TAN SOFT	3.0	
(3	Red	Mask off flavors	RICHE, RICHE EXTRA		
ing)	Red, White, Rosé	Enhances freshness, reveals fruits, balances mouthfeel	RADIANCE		
ling	Red, Rosé	Enhances fruit, adds complexity, minimizes greenness	ONYX		
Pre-bottling days before bottling)	Red, White	Increases structure, enhances aromatic complexity and masks off odors	ROYAL		
P ₁	Red, White, Rosé	Soften mouthfeel	See FLASHGUM R LIQUIDE, ULTIMA SOFT, FINAL TOUCH GUSTO and FINAL TOUCH TONIC in fining & stability (pgs 122, 124)		

STAVIN & THERMIC OAK INFUSION PRODUCTS

NEW <

StaVin Flavor Profiles

StaVin oak infusion products are produced using time-tested, traditional toasting methods. StaVin hand crafted Medium and Medium Plus toasts are fire toasted and designed to mimic the sensory impact and complexity of oak barrels. StaVin Savour and Savour DM are convection toasted, exhibit more uniformity, and provide unique flavor profiles not represented elsewhere in our portfolio.

Toast	Aroma	Impact	Frequently Used In	Available Formats	
Med Fire Toast	Vanilla, café mocha, brown sugar, cinnamon/allspice	Adds strong round tannins, structure, and volume	Light to medium-bodied white and red wines	Fan Packs, Segments, Mini	
Med+ Fire Toast	Vanilla, spice, smoked bacon, butterscotch, meaty, leather	Increased volume and length, smooth tannins, balance, increased complexity and perception of fire toast	Medium to full-bodied red wines	Cubes, Barrel Inserts	
Savour Convection Toast	Vanilla, brown sugar, brioche, cream soda, graham cracker	Adds soft tannins, increases volume	Light to medium-bodied white and red wines	Fan Packs, Segments, Barrel Inserts	
Savour DM Convection Toast	Vanilla, spice, mocha, toffee, butterscotch, sweet caramel	Increased volume and balance	Medium to full-bodied red wines		

See our website for all available oak infusion products including StaVin American Oak and additional formats and product sizes.

THERMIC Flavor Profiles

THERMIC is produced using a proprietary thermal modification process which results in a wide spectrum of flavor profiles that are incredibly consistent. THERMIC comes in fan packs, cubes, and barrel inserts, which are available in five distinct flavor profiles. Individual THERMIC profiles can be used on their own or used in combination to produce the desired oak impact. Additionally, THERMIC's consistency ensures that bench trials accurately predict the oak impact in your wine at production scale.

Your wine matrix may change with each vintage, but THERMIC will not.

Toast	Aroma	Impact	Frequently Used In	Available Formats
1	Coconut, sweet oak	Adds length	Light-bodied whites and reds	
2	Nutty, toasty, toffee	Rounding, boost of mid-palate	Chardonnay	
3	Vanilla, dark fruits, complexity	Adds texture, weight, volume, length	Barrel-fermented Chardonnay, Pinot noir, Grenache, and other light- bodied reds	Fan packs, Cubes, Barrel Inserts
4	Warm spice, vanilla	Full, viscous, rich	Medium to full-bodied reds, wines with herbaceousness	
5	Espresso, smoked meat, complexity	Creates balanced, rich, round mouthfeel	Full-bodied reds, wines with off-aromas and flavors	

Oak Infusion Product Formats

FAN PACKS	OAK CUBES (THERMIC)	NEW OAK SEGMENTS (STAVIN)
Speed of Impact: SLOW Compatible With: TANKS	Speed of Impact: FAST Compatible With: TANKS	Speed of Impact: FAST Compatible With: TANKS
NEW MINI CUBES	BARREL INSERTS	NEW INFUSION TUBE + MINI CUBES
Speed of Impact: VERY FAST Compatible With: TANKS	Speed of Impact: SLOW Compatible With: BARRELS	Speed of Impact: FAST Compatible With: BARRELS

FOR USE IN TANK

FAN PACKS

thermic

Slow release of oak compounds for use in tanks



Fan packs allow a slow extraction of oak compounds and are compatible for use in tanks.

- Can be used during fermentation and aging
- Subtle integration of oak compounds
- Suggested contact time of 3–24 months. Wine should be frequently tasted and evaluated to determine the exact contact time $\,$
- Fan packs are bound by nylon zip or stainless steel ties to allow for easy installation and removal

THERMIC FAN	PACKS
Size: 36" x 17/1	6" x 13/16"; 20 sq ft; 15 lb
Oak Source: Ar	merican (Quercus alba)
Color 1 Fan Pac	k – Item #Kb2110*
Color 2 Fan Pac	k – Item #Kb2120*
Color 3 Fan Pac	k – Item #Kb2130*
Color 4 Fan Pac	k – Item #Kb2140*
Color 5 Fan Pac	k – Item #Kb2150*

STAVIN FAN PACKS
Size: 36" x 1.5-2.5" x 3/8"; 44 sq ft
Oak Source: French (Quercus petraea, Q. robur)
Med Fan Pack – Item #ST2260F44*
Med+ Fan Pack – Item #ST2270F44*
Savour Fan Pack – Item #ST2361F44*
Savour DM Fan Pack – Item #ST2371F44*

CUBES & SEGMENTS

♦ thermic

Fast release of oak compounds for use in tanks





Oak cubes and segments allow quick extraction of oak compounds and are compatible for use in tanks. They are particularly useful for fermentation and for late and targeted adjustments.

- · Can be used during fermentation, aging, and finishing
- Designed for fast-to-market wines
- Suggested contact time of 3–18 months. Wine should be frequently tasted and evaluated to determine the exact contact time
- Oak cubes are packaged in food grade mesh bags. The bags have rugged handles to allow for easy tank installation and removal

THERMIC OAK CUBES
Size: 1" x 1 1/16" x 13/16"; 20lb bag
Oak Source: American (Quercus alba)
Color 1 Cubes – Item #Kb3110*
Color 2 Cubes – Item #Kb3120*
Color 3 Cubes – Item #Kb3130*
Color 4 Cubes – Item #Kb3140*
Color 5 Cubes – Item #Kb3150*

STAVIN OAK SEGMENTS		
Size: 2-3" x 1.5-2.5" x 3/8"; 15lb bag		
Oak Source: French (Quercus petraea, Q. robur)		
Med Segments – ST3260F15*		
Med+ Segments – ST3270F15*		
Savour Segments – ST3361F15*		
Savour DM Segments – ST3371F15*		

MINI CUBES

Very fast release of oak compounds for use in tanks



Mini cubes have a high surface area to volume ratio and allow very quick extraction of oak compounds and are compatible for use in tanks. They are particularly useful for fermentation and for late and targeted adjustments.

- · Can be used during fermentation, aging, and finishing
- Designed for fast-to-market wines
- Suggested contact time of 2–12 months. Wine should be frequently tasted and evaluated to determine the exact contact time
- Mini cubes are packaged in food grade mesh bags. The bags have rugged handles to allow for easy tank installation and removal
- · Available in fire toast only

NEW STAVIN MINI CUBES			
Size: 3/8" x 3/8" x 3/8"; 20lb bag			
Oak Source: French (Quercus petraea, Q. robur)			
Med Mini Cubes – ST7260F20*			
Med+ Mini Cubes – ST7270F20*			

FRUIT & MEAD

FOR USE IN BARRELS

BARREL INSERTS



Slow release of oak compounds for use in barrels



Inserts help achieve the aroma and flavor impact of new oak barrels in used or neutral barrels. Barrel inserts are also more cost-effective and sustainable than new oak barrels.

- · Used during fermentation, aging, and finishing
- Suggested contact time of 3–12 months. Wine should be frequently tasted and evaluated to determine the exact contact time
- Barrel inserts contain an eyelet screw for easy installation and removal

	THERMIC BARREL INSERTS	
	Size: 9" x 17/16" x 13/16"; 20 sections; 3.5 lb	
Oak Source: American (Quercus alba)		
	Color 1 Insert – Item #Kb4110*	
	Color 2 Insert – Item #Kb4120*	
	Color 3 Insert – Item #Kb4130*	
	Color 4 Insert – Item #Kb4140*	
	Color 5 Insert – Item #Kb4150*	

NEW	STAVIN BARREL INSERTS	
Size: 17.5° X ± 1° X ± $3/8^{\circ}$; 10 sections of 3 staves Oak Source: French (<i>Quercus petraea</i> , <i>Q. robur</i>)		
Med+Insert - Item #ST4270F10*		
Savour	Insert – Item #ST4361F10*	
Savour	DM Insert – Item #ST4371F10*	

INFUSION TUBE

for use with MINI CUBES

Fast release of oak compounds for use in barrels



The infusion tube was designed specifically for use with mini cubes. The stainless steel tube can hold up to 8 oz of mini cubes and can be cleaned and re-filled indefinitely.

- · Used during fermentation, aging, and finishing
- While extraction happens quickly, intensity of oak flavors and aromas is limited by amount of oak able to fit in the tube; this format is designed to mimic 30% of the intensity of a new oak barrel
- Suggested contact time of 2–12 months. Wine should be frequently tasted and evaluated to determine the exact contact time
- Infusion tubes and cubes are sold separately; Mini cubes are sold in 8 oz packs for use with the infusion tube (for 20 lb bags, see pg 85)
- · Available in fire toast only

	STAVIN INFUSION TUBE		
	Size: 29"x1.75"x5"		
	Source: 304 Stainless Steel		
Infusion Tube – ST9990099*			
	Tube Top Bung – ST9991099*		
	Tube Bottom Bung – ST9993099*		

1	STAVIN MINI CUBES (SMALL PACK)			
	Size: 8 oz pack			
-	Oak Source: French (Quercus petraea, Q. robur)			
	Med Mini Cubes – Item #ST7260F08*			
	Med+ Mini Cubes – Item #ST7270F08*			

ENZYMES

ARTICLE

HOW TO CHOOSE AND USE OAK INFUSION PRODUCTS IN BARREL

Oak infusion products can help replicate the aroma, flavor, and textural impact of new barrels and offer several advantages:

- Cost Savings: Oak infusion products cost less than new oak barrels
- Predict Oak Impact: The impact of oak infusion products can be quickly assessed through lab-scale trials with minimal barrel investment and wine volume
- Control Oak Impact: Oak infusion products allow you to control oak impact without needing to move or transfer wine; simply remove the infusion product when the desired impact has been achieved
- Sustainability: Using oak infusion products can extend the working life of older barrels

CHOOSING AN OAK INFUSION PRODUCT

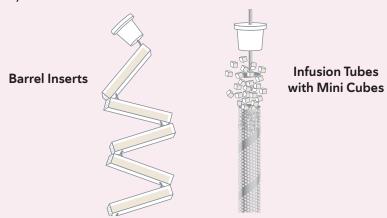
There are a few things to consider when choosing what format and flavor profile are best for your wine:

Flavor profile:

It is important to match the flavor profile of these products to the wine, and the only way to do that is through trials. Before selecting an oak infusion product, define the intended wine style. This will help narrow down the number of flavor profiles to try.

Flavor profile is affected by wood origin, toasting method, and toast level. We've created some helpful charts on pgs 83-84 that outline the flavor profiles and common uses of the oak infusion products in our portfolio. With experience, it will become easier to determine which products will produce the desired wine style.

Format (size & shape of oak):



We offer two formats compatible with barrels: Barrel Inserts and Infusion Tubes with Mini Cubes. The main winemaking difference between these is the speed of oak extraction. Barrel inserts may be preferred if a slower extraction is desired, especially during aging. Mini cubes have a high surface area to volume ratio and can impart oak characteristics more quickly, which may be desirable as a pre-bottling adjustment.

WHEN DO YOU ADD OAK INFUSION PRODUCTS TO BARREL?

Oak infusion products can be added at any point in the winemaking process, but some convenient times to add them include:

- · When barreling down
- Before the first topping after malolactic fermentation
- During a rack and return

These times are convenient because no wine must be removed to fit the infusion product into the barrel.

CAN YOU REUSE OAK INFUSION PRODUCTS?

You can reuse oak infusion products, but, like barrels, their impact is different with each use. When reusing oak infusion products, the best practice is to immediately transfer them into another wine. You must be confident that the original wine (and therefore the oak infusion product) is free of microbial concerns or cross-contamination may occur. Additionally, do not transfer products from red to white wine or wine color may be affected. We do not recommend cleaning and storing used oak infusion products.

STILL HAVE QUESTIONS ABOUT GETTING STARTED WITH THESE PRODUCTS?

Give us a call to connect with a technical specialist!

FERMENTATION OAK CHIPS

FEELWOOD! BALANCE & STRUCTURE

∂ loc

Boosts ripe fruit, masks vegetative characteristics

Frequently used in whites, rosés, reds

FEELWOOD! BALANCE & STRUCTURE oak chips are used during fermentation to minimize harsh and astringent characters.

- Herbaceous notes are minimized while fruit aromatics are amplified
- · Volume and mid-palate sweetness are enhanced
- 100% French oak chips are a blend of toast levels (untoasted, light, medium)
- · Aged for 24 months

Usage: For whites and rosés, chips must be used with infusion bags. For reds, add into the tank while filling

Storage: Dated expiration. Store in a cool dry, odor free environment below 25°C (77°F) away from ignition sources. Unopened, the shelf life is 4 years. Once opened, keep tightly sealed and dry.

Recommended Dosage			
White, Rosé	0.5-1 g/L	50-100 g/hL	4.15-8.3 lb/1000 gal
Red	1-3 g/L	100-300 g/hL	8.3-25 lb/1000 gal

10 kg (2 x 5 kg units, 2 infusion bags) - Item #15942*

FEELWOOD! SWEET & FRESH

Enhances fruit profile, sweetness and length

Frequently used in whites, rosés, reds

FEELWOOD! SWEET & FRESH oak chips are used during fermentation to enhance fruit, add mid-palate sweetness and increase the length of the finish.

- 100% untoasted French oak chips
- · Aged for 24 months

Usage: For whites and rosés, chips must be used with infusion bags. For reds, add into the tank while filling.

Storage: Dated expiration. Store in a cool dry, odor free environment below 25° C (77°F) away from ignition sources. Unopened, the shelf life is 4 years. Once opened, keep tightly sealed and dry.

Recommended Dosage				
White, Rosé	0.5-1 g/L	50-100 g/hL	4.15-8.3 lb/1000 gal	
Red	1-3 g/L	100-300 g/hL	8.3-25 lb/1000 gal	

10 kg (2 x 5 kg units, 2 infusion bags) - Item #15940*

FRUIT & MEAD

TANNINS

Tannins are naturally occurring polyphenolic compounds that contribute to wine aroma, structure, mouthfeel, and balance as well as protect from oxidative damage. Scott Laboratories' tannins can be added at any stage of winemaking to provide these benefits.

Tannins have a broad range of applications: antioxidation (preserving aroma, protecting color); building structure; building volume/roundness; enhancing aroma and adding freshness. Tannins are versatile and, depending on the tannin, they can be added before fermentation, during fermentation, during aging, or prior to bottling for last-minute adjustments.

Tannin can be extracted from a variety of sources. The tannins listed in this handbook were extracted from grapes (skins and seeds), oak (both American and European, toasted and untoasted), exotic woods and/or gallnuts. Tannins can form complexes with other compounds found in juice or wine and their behavior is highly dependent on the matrix. The complexes that form will determine the tannin's impact.

SENSORY IMPACT OF TANNINS

ANTIOXIDATION - All tannins have antioxidant abilites. though some are more effective than others at interacting with quinones and iron to interrupt the oxidation chain.

ANTIOXIDATION

ENHANCES AROMA - Tannins can add aromas and/or enhance existing aromas.

ENHANCES AROMA

BUILDS STRUCTURE - Certain tannins can increase tannin intensity while decreasing bitterness and astringency.

BUILDS STRUCTURE

INCREASES VOLUME/ROUNDNESS - Some tannins can increase mouthfeel and increase the perception of sweetness due to their ability to interact with other molecules like polysaccharides and even other tannins.

INCREASES VOLUME/ROUNDNESS

MASKS GREENNESS - Some tannins can add or enhance positive aromas and textures that minimize vegetal, herbaceous, and underripe characteristics.

MASKS GREENNESS

STABILIZES COLOR - Tannins can interact with anthocyanins (color pigments) to create larger, more stable complexes (polymeric pigments).

STABILIZES COLOR

DID YOU KNOW?

BENCH TRIALS ARE RECOMMENDED WHEN USING TANNINS!

We highly recommend performing bench trials with tannins. Many tannins in our portfolio have overlapping impacts. However, wine is a complicated matrix and may react better to a certain tannin over other similar tannins. Additionally, while there are recommended dosage ranges for each tannin in this book, bench trials will help determine the correct dosage for your wine.

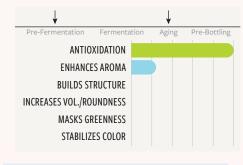
MICRO CONTROL

NEW

ESSENTIAL ANTIOXIDANT



Superior oxidation protection



Frequently used in juice impacted by *Botrytis*, juice or wine susceptible to oxidation, whites, rosés, fruit wines, cider

ESSENTIAL ANTIOXIDANT helps to protect delicate aromas and color from oxidative damage. This new tannin is highly purified and offers the highest rate of antioxidant protection of all the tannins within our portfolio.

- · Can inhibit laccase damage on Botrytis infected grapes
- Protects aromas and color of aromatic juices and wines that are susceptible to enzymatic browning
- · Minimal impact on mouthfeel when used at low dosages
- Highly effective gallnut tannin
- Minimum contact time: 3 weeks

Usage: Dissolve ESSENTIAL ANTIOXIDANT in about ten times its weight of warm water 35–40°C (95–104°F) until fully dissolved. Add gradually during a transfer or pumpover. Good mixing 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.

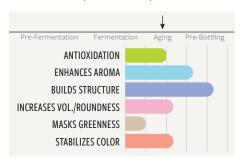
Storage: Store at $5-25^{\circ}$ C ($41-77^{\circ}$ F) in a dry, well-ventilated, odor-free environment. Once opened, the product must be used rapidly.

Recommended Dosage - Bench trials recommended for wine					
Juice	3-6 g/hL	30-60 ppm	0.25-0.5 lb/1000 gal		
Oxygen Sensitive Juice	5-10 g/hL	50-100 ppm	0.42-0.83 lb/1000 gal		
Wine	1-4 g/hL	10-40 ppm	0.08-0.32 lb/1000 gal		

1kg - Item #15984*

ESTATE

Enhances fruit, spice, and mid-palate



Frequently used in reds

SCOTT'TAN™ ESTATE can enhance mid-palate, aromatic complexity, and mouthfeel.

- · Highlights red and dark fruit aromas and can bring out spiciness
- Can build mid-palate and enhance structure
- Can compensate for the lack of tannins in neutral barrels
- Blend of tannins from grapes, ellagic tannins from untoasted oak, and Quebracho
- · Minimum contact time: 6 weeks

Usage: Dissolve ESTATE in about ten times its weight of warm water $35-40^{\circ}\text{C}$ ($95-104^{\circ}\text{F}$) until fully dissolved. Add gradually during a transfer. Mix well to ensure homogeneity. Following organoleptic evaluations, 2-3 further additions can be made prior to racking. 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.

Recommended Dosage - Bench trials recommended for wine				
Prior to Barrel Aging 50-300 ppm 5-30 g/hL 0.42-2.5 lb/1000 gal				
Prior to Bottling (3-6 weeks) 50-100 ppm 5-10 g/hL 0.42-0.83 lb/100				

1 kg – Item #15958*

ENZYMES

FT BLANC

Protection from oxidation and early protein removal

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Frequently used in whites, rosés, reds, fruit wines, cider

SCOTT'TAN™ FT BLANC can be used to increase the tannin content of grapes and juice while protecting color and aromas from oxidative browning.

- Can contribute notes of minerality
- Can increase tannin levels in low tannin juice and wine
- Can inhibit laccase damage due to its antioxidant properties, but for maximum antioxidant protection in the case of mold damage and high laccase potential, ESSENTIAL ANTIOXIDANT (pg 90) is the preferred tannin
- Can help remove some heat unstable proteins, especially in protein-rich grape varieties such as Sauvignon blanc and Gewürztraminer
- · Can minimize the impact of hydrogen sulfide
- Gallnut tannin derived from Tara
- · Minimum contact time: 3 weeks

Usage: Add FT BLANC by sprinkling directly on grapes at the crusher. If adding to juice or wine, dissolve in about ten times its weight of warm water $35-40^{\circ}\text{C}$ ($95-104^{\circ}\text{F}$) and add ensuring good homogenization. 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.

Recommended Dosage - Bench trials recommended for wine					
Juice 50-150 ppm 5-15 g/hL 0.42-1.2 lb/1000 gal					
Wine	<i>line</i> 50-300 ppm		0.42-2.5 lb/1000 gal		
Fruit Wine, Cider, Mead	50-200 ppm	5-20 g/hL	0.42-1.6 lb/1000 gal		

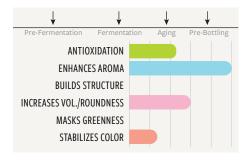
1 kg - Item #15954*

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5 kg - Item #15969*

FT BLANC CITRUS

Enhances fruity and floral aromas



Frequently used in whites, rosés, cider

SCOTT'TAN™ FT BLANC CITRUS increases aromatic complexity, enhances freshness, and can impact volume and roundness.

- Aromas are greater when FT BLANC CITRUS is used during fermentation and in conjunction with a yeast strain with β -glycosidase activity (see pgs 14–15 and look for yeast identified as enhancing varietal characteristics)
- Wines show more intense aromas of lemon, grapefruit, apple, and white flowers
- · Small doses can be added to finished wines to enhance freshness and aroma complexity
- Protects juice and wine from oxidation
- Blend of tannins from citrus wood and gallnuts
- Minimum contact time: 3 weeks

Usage: Dissolve FT BLANC CITRUS in about 10 times its weight of warm water $(35-40^{\circ}\text{C}/95-104^{\circ}\text{F})$ then add it to the juice/wine and mix well. If using during alcoholic fermentation add 24–48 hours after yeast inoculation. Final additions should be made at least 3 weeks prior to bottling.

Storage: Dated expiration. Unopened, the shelf-life is 5 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage - Bench trials recommended for wine					
Juice, Cider	20-150 ppm	2-15 g/hL	0.17-1.2 lb/1000 gal		
Wine	50-100 ppm	5-10 g/hL	0.42-0.83 lb/1000 gal		

1 kg - Item #15974*

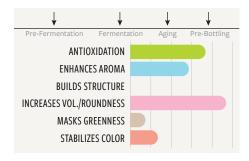
5 kg - Item #15975*

FRUIT & MEAD

FT BLANC SOFT

Oxidation protection and mouthfeel enhancement

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Frequently used in whites, rosés, reds, hybrids, fruit wines, mead

SCOTT'TAN™ FT BLANC SOFT can be used to protect color and aromas from oxidative browning while improving mouthfeel and balance.

- Provides some antioxidative protection (for maximum antioxidant protection in the case of mold damage and high laccase potential, ESSENTIAL ANTIOXIDANT (pg 90) is the preferred tannin)
- Wines have enhanced texture, fuller mid-palate, and a perception of sweetness
- Relatively small dosages can contribute to freshness
- Similar improvements can be seen in fruit wines and mead
- Can be used at any time during the winemaking process
- Blend of gallic tannins derived from gallnuts and Tara
- Minimum contact time: 3 weeks

Usage: Add FT BLANC SOFT by sprinkling directly on grapes at the crusher. If adding to juice or wine, dissolve in about ten times its weight of warm water $35-40^{\circ}$ C ($95-104^{\circ}$ F) and add ensuring good homogenization. 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.

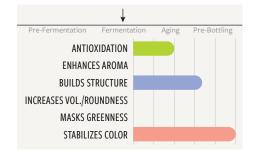
Recommended Dosage - Bench trials recommended for wine				
Juice	50-150 ppm	5-15 g/hL	0.42-1.2 lb/1000 gal	
Wine	50-300 ppm	5-30 g/hL	0.42-2.5 lb/1000 gal	
Fruit Wine, Cider, Mead	50-200 ppm	5-20 g/hL	0.42-1.6 lb/1000 gal	

1 kg – Item #15955* 5 k

* 5 kg – Item #15980*

FT COLORMAX

Promotes color stability



Frequently used in reds, hybrids, fruit wines

SCOTT'TAN™ FT COLORMAX is used to enhance structure and for its superior ability to stabilize color.

- Its special formulation goes into solution easily
- It is intended for use in conjunction with FT ROUGE or FT ROUGE SOFT (pgs 93-94).
- · Catechin from exotic woods
- · Contact time: during fermentation

Usage: Dissolve FT COLORMAX in about ten times its weight of warm water $35-40^{\circ}$ C ($95-104^{\circ}$ F) and add at 1/3 sugar depletion during alcoholic fermentation, ensuring good homogenization. If a cold soak has been done, add FT COLORMAX during the first mixing.

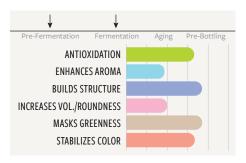
Storage: Dated expiration. Unopened, the shelf-life is 5 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage			
Red Must	100-300 ppm	10-30 g/hL	0.8-2.5 lb/1000 gal

1 kg - Item #15968*

FT ROUGE

Promotes color, structure, and fruit



Frequently used in medium-bodied reds, full-bodied reds, fruit wines

SCOTT'TAN $^{\text{TM}}$ FT ROUGE, when added at the beginning of a red wine fermentation, can help preserve the grapes' natural tannins so they can bind color molecules (anthocyanins) for optimal color stability.

· Mouthfeel is also enhanced

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- Provides some antioxidative protection (for maximum antioxidant protection in the case of mold damage and high laccase potential, ESSENTIAL ANTIOXIDANT (pg 90) is the preferred tannin)
- Blend of highly reactive tannins derived from exotic woods and chestnut
- · Contact time: during fermentation

Usage: Gradually pour FT ROUGE directly on grapes at the crusher or dissolve in about ten times its weight of warm water $35-40^{\circ}\text{C}$ ($95-104^{\circ}\text{F}$) and add to the must during a pumpover. If subsequent additions are desired, this can be done in increments of 0.5 lb/1000 gal (-60 ppm) and mix thoroughly. **Storage:** Dated expiration. Unopened, the shelf-life is 5 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

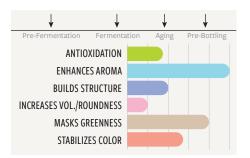
Recommended Dosage				
Red Vinifera Must & Fruit Wine	200-500 ppm	20-50 g/hL	1.6-4.0 lb/1000 gal	
Red Non-Vinifera Must	300-600 ppm	30-60 g/hL	2.5-5.0 lb/1000 gal	

1 kg - Item #15950*

5 kg - Item #15951*

FT ROUGE BERRY

Enhances red berry fruit aromas, diminishes vegetative notes



Frequently used in rosés, reds, hybrids

SCOTT'TAN™ FT ROUGE BERRY is beneficial for low aromatic and low color varietals to optimize flavor, aromas, and color stability.

- Enhances strawberry, cherry, and blueberry aromas
- Aromas are greater when FT ROUGE BERRY is used during fermentation and in conjunction with a yeast strain with β -glycosidase activity (see pgs 16-17 and look for yeast identified as enhancing varietal characteristics)
- Masks green/vegetative notes
- Blend of condensed tannins from red berry plants
- · Minimum contact time: 3 weeks

Usage: Dissolve FT ROUGE BERRY in about 10 times its weight of warm water (35–40°C/95–104°F) then add it to the must/wine and mix well. If using during alcoholic fermentation add 24–48 hours after yeast inoculation. When used post–alcoholic fermentation add it to the wine and mix well. Final additions should be made at least 3 weeks prior to bottling.

Storage: Dated expiration. Unopened, store in a cool dry, ventilated area. Once opened, keep tightly sealed and dry.

Recommended Dosage - Bench trials recommended for wine					
Rosé Must 20-150 ppm 2-15 g/hL 0.17-1.2 lb/1000 gal					
Red Must and Wine	50-200 ppm	5-20 g/hL	0.42-1.6 lb/1000 gal		

1 kg – Item #15972*

5 kg – Item #15973*

FT ROUGE SOFT

Promotes color, mouthfeel, and fruit



Frequently used in light-bodied reds, medium-bodied reds, fruit wines

SCOTT'TAN™ FT ROUGE SOFT is appreciated for its ability to highlight fruit aromas and flavors, integrate harsh tannins, and balance mouthfeel.

- · Mouthfeel and roundness are improved, and bitterness is reduced
- Integrates well and does not leave an obvious impression of a tannin addition
- Helps to stabilize color

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- · Can help to protect aromas and color from oxidative damage
- · Blend of tannins from exotic woods and oak
- · Contact time: during fermentation

Usage: Gradually pour FT ROUGE SOFT directly on grapes at the crusher or dissolve in about ten times its weight of warm water $35-40^{\circ}\text{C}$ ($95-104^{\circ}\text{F}$) and add to the must during a pumpover. If subsequent additions are desired, this can be done in increments of 0.5 lb/1000 gal (-60 ppm) and mix thoroughly. **Storage:** Dated expiration. Unopened, the shelf-life is 5 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

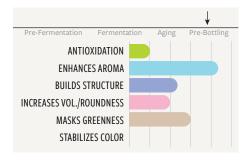
Recommended Dosage				
Red Vinifera Must & Fruit Wine	200-500 ppm	20-50 g/hL	1.6-4.0 lb/1000 gal	
Red Non-Vinifera Must	300-600 ppm	30-60 g/hL	2.5-5.0 lb/1000 gal	

1 kg – Item #15952*

5 kg – Item #15953*

ONYX

Enhances red fruit and berry aromas, minimizes greenness



Frequently used in rosés, reds, hybrids

SCOTT'TAN $^{\text{\tiny TM}}$ ONYX integrates mouthfeel and flavors and enhances aromatic complexity while respecting varietal characteristics.

- · Brings out berry and sweet red fruit aromas
- · Can minimize green, herbaceous notes
- · Rapidly integrates
- Great for "last-minute" additions conduct filterability trials to avoid filtration challenges
- · Derived from French oak
- Minimum contact time: 48 hours

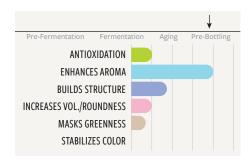
Usage: Dissolve ONYX in about ten times its weight of warm water $35-40^{\circ}\text{C}$ ($95-104^{\circ}\text{F}$) until fully dissolved. Add to wine gradually during a transfer or pumpover. Good mixing is important. **Storage:** Dated expiration. Unopened the shelf-life is 4 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage - Bench trials recommended for wine				
Wine	10-100 ppm	1-10 g/hL	0.08-0.83 lb/1000 gal	

250 g - Item #15977*

RADIANCE

Enhances freshness, reveals fruit and oak aromas



Frequently used in whites, reds, rosés, cider

SCOTT'TAN™ RADIANCE integrates rapidly and helps to unmask and refine aromas, bringing an aromatic freshness to wines.

- · Highlights fresh fruit, vanilla, coconut, and caramel
- Promotes balance and mouthfeel while maintaining acidity
- Rapidly integrates
- Great for "last-minute" additions conduct filterability trials to avoid filtration challenges
- Blend of tannins from lightly toasted French oak
- Minimum contact time: 48 hours

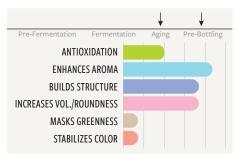
Usage: Dissolve RADIANCE in about ten times its weight of warm water $35-40^{\circ}\text{C}$ ($95-104^{\circ}\text{F}$) until fully dissolved. Add to wine gradually during a transfer or pumpover. Good mixing is important. **Storage:** Dated expiration. Unopened the shelf-life is 4 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage - Bench trials recommended for wine				
Wine	10-100 ppm	1-10 g/hL	0.08-0.83 lb/1000 gal	

250 g - Item #15978*

RICHE

Sweetness and finesse



Frequently used in whites, rosés, reds, hybrids

SCOTT"TAN™ RICHE is notable for enhancing mouthfeel and aromatic complexity, giving a hint of sweet oak.

- Imparts hints of vanilla and nuttiness together with an oak sweetness
- · Respectful of varietal character and adds nuanced notes without being overpowering
- · Integrates quickly
- · Can contribute the finishing touch to your wine
- Derived from 100% toasted French oak
- Minimum contact time: 3 weeks

Usage: Dissolve RICHE 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.

Recommended Dosage - Bench trials recommended for wine					
White/Rosé Wine 30-100 ppm 3-10 g/hL 0.25-0.83 lb/1000 gal					
Red Wine	30-200 ppm	3-20 g/hL	0.25-1.6 lb/1000 gal		

500 g - Item #15962*

RICHE EXTRA

Smoothness and richness



Frequently used in reds, whites, hybrids

SCOTT"TAN™ RICHE EXTRA enhances aromatic complexity and adds richness to the palate.

- Heightens the perception of vanilla and coconut
- Can help build mid-palate structure and a smooth finish
- · It can contribute the finishing touch to your wine
- Integrates quickly
- Derived from 100% toasted American oak
- · Minimum contact time: 3 weeks

Usage: Dissolve RICHE EXTRA 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.

Recommended Dosage - Bench trials recommended for wine					
White/Rosé Wine	30-100 ppm	3-10 g/hL	0.25-0.83 lb/1000 gal		
Red Wine	30-200 ppm	3-20 g/hL	0.25-1.6 lb/1000 gal		

500 g - Item #15963*

ROYAL

Increases structure, enhances aromatic complexity and masks off-odors



Frequently used in whites, reds

SCOTT'TAN $^{\text{m}}$ ROYAL may be used to increase aromatic complexity, gently enhance structure, and add length to the palate.

- · It is known to bring out aromas of cocoa, chocolate, coffee, and butterscotch
- Can help mask Brettanomyces off-aromas and flavors
- · Rapidly integrates
- Great for "last-minute" additions conduct filterability trials to avoid filtration challenges
- Extracted from American oak
- Minimum contact time: 48 hours

Usage: Dissolve ROYAL in about 10 times its weight of warm water $35-40^{\circ}\text{C}$ ($95-104^{\circ}\text{F}$) until fully dissolved. Add to wine gradually during a transfer or pumpover. 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.

Recommended Dosage - Bench trials recommended for wine					
Wine 10-100 ppm 1-10 g/hL 0.08-0.83 lb/1000 ga					

250 g - Item #15979*

UVA'TAN

Grape seed and skin tannin to compensate for tannin deficiencies and add structure

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Frequently used in reds, whites, rosés

SCOTT'TAN $^{\text{TM}}$ UVA'TAN can be used during all stages of winemaking and can increase the tannin content of wines, stabilize color, enhance structure, and protect against oxidation.

- UVA'TAN can compensate for tannin deficiency in vintages when grape tannin content is low, seeds are unripe, or in cases where over-ripe grapes were watered-back
- UVA'TAN assists with oak tannin integration when used during barrel aging
- It is high in polyphenols but low in astringency
- Additions should be made at least six weeks before bottling, though smaller additions closer to bottling can still be beneficial. Conduct filterability trials to avoid filtration challenges
- · Composed of grape seed and grape skin tannins
- Minimum contact time: 6 weeks

Usage: Add UVA'TAN by sprinkling directly on grapes at the crusher. If adding to juice or wine, dissolve in about ten times its weight of warm water $35-40^{\circ}\text{C}$ (95–104°F) and add ensuring good homogenization. Final additions can be made up to three weeks before bottling, though six weeks are recommended for more complete polymerization, settling, and optimal filtration.

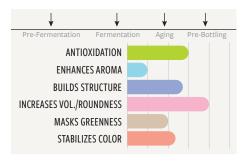
Storage: Dated expiration. Unopened, the shelf-life is 5 years at 18° C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage - Bench trials recommended for wine					
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		

500 g - Item #15964*

UVA'TAN SOFT

Grape skin tannin for mouthfeel enhancement and balancing oak



Frequently used in reds, whites, rosés

SCOTT'TAN™ UVA'TAN SOFT positively impacts mouthfeel, increasing roundness and softness without imparting bitterness.

- Useful when grapes' native tannins are deficient and mouthfeel is lacking
- Assists with the integration of oak tannins during barrel aging
- At low dosages, can optimize the aging potential of white and rosé wines
- Can be used at all stages of winemaking
- Additions should be made at least six weeks before bottling, though smaller additions closer to bottling can still be beneficial. Conduct filterability trials to avoid filtration challenges
- Highly reactive tannins prepared from freshly pressed white grape skins
- · Minimum contact time: 6 weeks

Usage: Add UVA'TAN SOFT by sprinkling directly on grapes at the crusher. If adding to juice or wine, dissolve in about ten times its weight of warm water 35–40°C (95–104°F) and add ensuring good homogenization. Final additions can be made up to three weeks before bottling, though six weeks are recommended for more complete polymerization, settling, and optimal filtration.

 $\textbf{Storage:} \ \ \text{Dated expiration.} \ \ \text{Unopened, the shelf-life is 5 years at 18°C (65°F).} \ \ \text{Once opened, keep tightly sealed and dry.}$

Recommended Dosage - Bench trials recommended for wine						
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			

500 g - Item #15965*

ADDITIONAL RESOURCES

Please scan the codes below or visit our website to view our bench trial protocol and wine finishing kit.



Bench Trial Protocol scottlab.com/bench



Finishing Kit scottlab.com/finishing-kit



Scott Laboratories knows enzymes.

Our enzymes have been synonymous with quality and ease-of-use for over 25 years. The benefits of enzymes are often overlooked and undervalued, but not by us! We appreciate the specialized and nuanced activities of these biological tools and know that they help make processing easier at all stages of winemaking. We are committed to sharing the benefits of enzymes with producers of any size, so we offer a variety of package sizes and formats.



At almost every stage of the winemaking process proper enzyme use can improve quality, save costs, and help avoid downstream challenges.

Enzymes are present in all plants and animals, including grapes, yeast, and bacteria, and are responsible for catalyzing a variety of reactions that would otherwise occur more slowly. Enzymes are also naturally present in grapes, juice, and wine but their activity is limited by fermentation and wine conditions. Enological enzymes can be added to compensate for this lack of activity. Enological enzymes are purified from fungi, including *Aspergillus niger* and *Trichoderma harzianum*.

In winemaking, the main function of enological enzymes is to break down pectin and other structural polysaccharides. Pectin is a complex and large molecule that, if left in its native form, can cause clarification and filtration challenges. However, enzymes can do so much more than that:

BENEFITS OF ENZYMES IN JUICE AND WINE

IMPROVE CLARIFICATION AND FILTRATION	Scott Laboratories likes to think of clarification and filtration as "dance partners," as proper clarification will make filtration easier. Enzymes will increase the efficiency of both processes: • Enzymes will increase the efficiency of clarification practices at all stages of winemaking by breaking down pectin that traps solids in suspension. This also allows fining agents to more efficiently bind and remove target compounds. • Enzymes help break down glucans and other polysaccharides that cause filtration challenges.
INCREASE YIELDS	Using enzymes will help increase yields. Enzymes will break down pectin in grape pulp thereby releasing trapped juice and decreasing solids. This allows more, higher quality juice at lower pressing pressures (smaller hard press fraction).
INCREASE VARIETAL AROMA	 Enzymes can increase varietal aromas in two ways: Skin contact enzymes can help release aroma precursors into the must or juice, though some of these aroma precursors will be released in an odorless form. Other enzymes added post-pressing and/or post-fermentation can help convert those odorless aroma compounds into odor-active forms.
INTENSIFY AND STABILIZE COLOR	Enzymes can accelerate the release of anthocyanins and tannins during fermentation resulting in wines with brighter, more stable color and enhanced structure.
ENHANCE MOUTHFEEL	The same enzymes that intensify and stabilize color also promote tannin extraction, which impacts mouthfeel and adds structure. Some other enzymes, like β -glucanases, will accelerate yeast autolysis, releasing mannoproteins which increases roundness and the perception of sweetness.

FACTORS IMPACTING ENZYME ACTIVITY

Temperature	Extent of Contact: Time and Mixing	Dosage	Interactions with Other Products
Ideal temperature for enzyme activity is 10-30°C (50-86°F).	Time: The longer the enzyme is left to work, the more work it can do.	The dosage required varies depending on enzyme concentration, contact time level of	Some products will immediately halt enzyme activity (see pg 105) including:
LOW TEMP: At temperatures <10°C/50°F enzymes will still work, but slowly. HIGH TEMP: At temperatures	Unfortunately, due to processing demands, time is often the limiting factor.	tration, contact time, level of pectin, stage of production, and presence of inhibitory substances.	- High SO ₂ additions - Bentonite additions - Tannin additions
>60°C/140°F, the enzyme can be denatured and destroyed. Be mindful when using enzymes	Mixing: The more often a vessel is mixed, the greater the ability of the enzyme to come in con-		Time these additions carefully and never mix enzymes directly with any of these additives .
at cold temperatures. Some of our enzymes are optimized for use at low temperatures.	tact with its substrate (pectin).		To completely stop all enological enzyme activity, add 5-10 g/hL bentonite.

QUICK GUIDE TO CHOOSING ENZYMES

	LALLZYME CUVEE BLANC	RAPIDASE EXPRESSION AROMA	RAPIDASE REVELATION AROMA	LALLZYME EX	LALLZYME EX-V	SCOTTZYME COLOR PRO
Pg	102	103	104	102	102	105
n)		Aroma Release			Maceration	
Primary Use	Extracts skin- trapped varietal aoma compounds	Extracts skin- trapped varietal aroma compounds	Releases sugar bound aroma compounds	Higher yield at lower pressing pressures (smaller hard press fraction)	Higher yield at lower pressing pressures (smaller hard press fraction)	Higher yield at lower pressing pressures (smaller hard press fraction)
Secondary Uses	Higher yield at lower pressing pressures (smaller hard press fraction) Continued aroma release during fermentation	Higher yield at lower pressing pressures (smaller hard press fraction)	Clarification	Releases color molecules	Enhances structure Releases color molecules	Masks greeness Releases color molecules
Stage of Production	Grapes/in press (white, rosé)	Grapes (white, rosé)	Wine (all wines)	Grapes/must (red)	Grapes/must (red)	Grapes/must (red)
Formulation	Pectinase with β-glycosidase side activities	Pectinase	Pectinase with β-glycosidase side activities	Pectinase with cellulase and hemicellulase side activities	Pectinase with cellulase and hemicellulase side activities	Pectinase with protease side activities
Format	Granular	Granular	Granular	Granular	Granular	Liquid

DID YOU KNOW?

NOT ALL PECTINASES ARE THE SAME

All enological enzymes are pectinase-based and some have overlapping uses, but they are inherently different on several fronts. The strain of Aspergillus niger used to produce the enzymes will vary. The secondary and tertiary activities will differ. Even if they contain similar enzymes, the concentrations of the components will differ. Remember, enzyme formulations are cocktails and the best way to know what works for you is to try them out.

QUICK GUIDE TO CHOOSING ENZYMES

RAPIDASE CLEAR EXTREME	SCOTTZYME CINN-FREE	SCOTTZYME HC	SCOTTZYME KS	LALLZYME MMX	SCOTTZYME PEC5L	SCOTTZYME SPECTRUM
103	104	105	106	103	106	107
		Pressing, Clarificat	ion, Fining, and Filtr	ation improvement		
Rapid clarification under difficult conditions	Aids in pressing	Clarification in American, hybrid, and non-grape wines	Filtration	Yeast autolysis	Clarification	Filtration
Lees compaction	Extracts skin- trapped varietal compounds	Filtration	Clarification under difficult conditions	Filtration	Improves pre and post- fermentation processes	Clarification under difficult conditions
Juice (white, rosé)	Grapes or juice (white, rosé)	Juice or wine	Juice or wine (all wines)	Wine (all wines)	Grapes, juice, or wine (all wines)	Wine (all wines)
Pectinase	Pectinase	Pectinase with cellulase side activities	Pectinase	Pectinase with β-glucanase side activities	Pectinase	Pectinase
Granular	Liquid	Liquid	Liquid	Granular	Liquid	Liquid

DID YOU KNOW?

ENZYME DOSAGES ARE HIGHER IN WINE THAN JUICE

Alcohol and SO_2 inhibit and slow enzyme activity, but the enzymes will still work. Adding a higher dosage of enzyme to wine will help overcome those challenges.

ENZYMES LALLZYME CUVÉE BLANC LALLZYME CUVÉE BLANC™

Skin contact enzyme for aroma release, juice extraction, and clarification

Add to:

White grapes, red grapes that are being used for rosé

Impact:

Extracts skin-trapped varietal compounds, increases yields

Format:

Granular

Frequently used in Sauvignon blanc, Chardonnay, rosés

LALLZYME CUVÉE BLANC™ releases varietal aromas (thiols and terpenes) trapped in the grape skins, improves juice yield, and aids in clarification resulting in easier processing, increased aromas, flavors, and complexity.

- Increases fruity (tropical and citrus) and floral aromas
- Can increase boxwood "green" thiols, depending on levels in the grapes
- Increases yields at lower pressing pressures (smaller hard press fraction)
- Aids in fast clarification
- Enzyme is active from 5-12°C (41-53°F)
- Recommended contact time 2-12 hours
- Pectinase with ß-glycosidase side-activities
- ß-glycosidase activity will be inhibited at the beginning of fermentation due to the high glucose concentration; enzyme activity will begin once glucose is < 50 g/L
- Enzyme activity can be deactivated using bentonite

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.

Recommended Dosage		
Crushed Grapes	20 g/ton	

100 g - Item #16203*

LALLZYME EX



Increased fruity aromas, mouthfeel, and color stability

Add to:

Red grapes

Impact:

Increases yields, releases color molecules

Format:

Granular

Frequently used in light-bodied reds, medium-bodied reds

LALLZYME EX™ increases juice extraction, liberates color, improves wine filterability, and provides gentle maceration, even if phenolic maturity has not been reached.

- Early release of color
- Progressive liberation of polyphenols and tannin-bound polysaccharides helping to build mouthfeel and stabilize color
- Enzyme is active from 18-28°C (64-82°F)
- Recommended contact time 2-8 days
- · Pectinase with cellulase, and hemicellulase side activities

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.

 Recommended Dosage

 Crushed Grapes
 15-30 g/ton

 100 g - Item #16204*
 250 g - Item #16205*

LALLZYME EX-V



Increased aroma complexity, color stability, mouthfeel, and tannin structure

Add to:

Red grapes

Impact:

Increases yields, releases color molecules, enhances structure

Format:

Granular

Frequently used in medium-bodied reds, full-bodied reds

LALLZYME EX-V™ positively impacts color stability, structure, and aromatic complexity.

- Rapid release of color pigments (anthocyanins) and tannins, leading to stable polymeric pigments
- Wines are highly structured with deep, stable color
- Increases the release of aromatic compounds while respecting varietal characteristics
- Enzyme is active from 18-28°C (64-82°F)
- Recommended contact time 2-8 days, and dosage can be split if undergoing extended maceration
- Pectinase with cellulase, and hemicellulase side-activities

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.

Recommended Dosage		
Crushed Grapes	10-20 g/ton	

100 g - Item #16206*

500 g - Item #16208*

ENZYMES

LALLZYME MMX



Break down yeast cells and glucans from Botrytis

Add to:

Difficult to settle/filter wines post-fermentation

Impact:

Filtration, yeast autolysis

Format:

Granular

Frequently used in reds, whites, rosés

LALLZYME MMX $^{\text{m}}$ breaks down filter-clogging glucans that can be present due to the activity of *Botrytis* or other glucan-producing microorganisms.

- Can be added to wine aging on lees to increase yeast autolysis rates, leading to rounder, fuller-bodied wines
- Can integrate mouthfeel components by releasing "sweet" peptides
- Recommended contact time is 6-8 weeks
- Pectinase and glucanase act synergistically to improve the clarity and filterability of wines containing glucans from *Botrytis*

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.

Recommended Dosage: Bench trials recommended					
Botrytis infected wine	2-3 g/hL	20-30 ppm	0.167-0.25 lb/1000 gal		
Red wine	4-5 g/hL	40-50 ppm	0.33-0.42 lb/1000 gal		
White/Rosé wine	2-3 g/hL	20-30 ppm	0.167-0.25 lb/1000 gal		

100 g - Item #16207*

RAPIDASE CLEAR EXTREME

RAPIDASE

Superior juice clarification at low temperatures

Add to:

Juice pan, pressed juice

Impact:

Rapid clarification under difficult conditions, lees compaction

Format:

Granular

Frequently used in hybrids, cider, low-temperature juice

RAPIDASE® CLEAR EXTREME can be used to quickly reduce juice viscosity resulting in superior juice clarification, especially in difficult conditions (low temperature, low pH, hard-to-settle varieties).

- · Rapidly breaks down pectin and promotes particle aggregate
- · Aids in fast clarification
- Can be used during flotation
- Results in compact lees
- Preserves juice aromatic freshness
- Enzyme is active from 6-50°C (43-122°F)
- Recommended contact time 2-12 hours
- · Pectinase with essential side activities

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 (39-45°F). Once rehydrated, use within a few hours.

Recommended Dosage		
Juice	1-4 g/hL	38-152 g/1000 gal

100 g – Item #16257*

RAPIDASE EXPRESSION AROMA

RAPIDASE

Skin contact enzyme for aroma release, especially from thick-skinned grapes

Add to:

White grapes, red grapes for rosé wines

Impact:

Extracts skin-trapped varietal compounds, increases yields

Format:

Granular

Frequently used in Sauvignon blanc, Semillon, Chenin blanc, rosés, other aromatic thiol-containing whites RAPIDASE® EXPRESSION AROMA is used for the early extraction of aroma precursors from white grapes, which optimizes aromatic compounds and the complexity of the final wine.

- Releases varietal aroma precursors (e.g., thiols and terpenes) without extracting unwanted polyphenolic compounds
- Can help with settling
- Enzyme is active from 8-45°C (46-113°F)
- Recommended contact time 2-6 hours
- It is particularly useful for thick-skinned or early harvest grapes
- Pectinase with essential side activities

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 5-15°C (41-59°F). Once rehydrated, use within a few hours.

Recommended Dosage	
Crushed Grapes	20-25 g/ton

100 g - Item #16260*

MICRO CONTROL

RAPIDASE REVELATION AROMA

Increased release of fruity and floral aromas post-fermentation

Add to:

White or rosé wines

Impact:

Releases sugar bound aroma compounds, clarification

> Format: Granular

Frequently used in Muscat, Riesling, Gewürztraminer, rosés of Syrah, other terpene-containing grapes

RAPIDASE® REVELATION AROMA is used post-fermentation to increase varietal-based fruity and floral aromas.

- Releases glycosylated terpenes for intense and complex fruity and floral aromas
- Respects varietal characters
- Enzyme is active from 10-40°C (50-104°F)
- · Allow the enzyme to remain in contact with wine until desired levels of aromatic compounds are achieved
- Pectinase with alpha- and β -glycosidase side activities
- The wine should be <5 °Brix (<50 g/L glucose) for proper enzyme activity
- Once the desired effect has been achieved, halt enzyme action with a (5-10g/hL) bentonite addition

Usage: Dissolve RAPIDASE REVELATION AROMA in 10 times its weight of water, stir gently, allow to sit for a few minutes, then add to wine and mix. Enzyme can be deactivated with a 5-10 g/hL bentonite

Storage: Dated expiration. Store refrigerated at 5-15°C (41-59°F). Once rehydrated, use within a few

Recommended Dosage –Bench trials recommende		
White/Rosé Wine	1-2 g/hL	35-70 g/1000 gal
Red Wine	2-2.5 g/hL	70-90 g/1000 gal

100 g - Item #16266*

SCOTTZYME CINN-FREE

All-purpose enzyme for white and rosé juice

Add to:

Press or pressed juice

Impact:

Aids in pressing and settling, extracts skin trapped varietal compounds

Format:

Liquid

Frequently used in Sauvignon blanc, Viognier, Pinot gris, Gewürztraminer, Riesling, Chardonnay, Vignoles, rosés

SCOTTZYME® CINN-FREE is a gentle enzyme that aids in pressability and settling in low-solid content juice.

- Can release varietal aromas and aromatic precursors that are trapped in the pectin matrix
- · Increases yield
- · Generally results in compact juice lees
- Can improve wine filterability
- Not suitable for high pectin or high solid juice
- Optimal contact time is 3 days at 15°C (60°F). In cases when the tank temperature is cooler (-1-15°C/30-60°F), contact time should be 4-7 days and stirring is recommended
- Purified pectinase with very low cinnamyl esterase activity

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 (39°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Recommended Dosage		
Crushed Grapes	15-30 mL/ton	
Juice	1.3-1.6 mL/hL	50-60 mL/1000 gal

1 kg (890 mL) - Item #16175* 25 kg (22.25 L) - Item #16165*

SCOTTZYME COLOR PRO

Increased tannin profile, color stability, and reduced "veggie" character in red wine

Add to:

Grapes, red must

Impact:

Increases yield, releases color molecules, masks greeness

Format:

Liquid

Frequently used in reds

SCOTTZYME® COLOR PRO is a gentle macerating enzyme that increases yield and extraction of color and structure compounds.

- Wines made using COLOR PRO appear to have deeper, darker, and more intense color
- Gentle extraction of tannins positively impacts wine structure
- Mouthfeel is positively impacted; roundness is increased and herbaceous and veggie characters are minimized
- · Improved clarity, yield, and filterability
- Minimum contact time is 3 days at 15° C (60°F). In cases when the tank temperature is cooler (-1-15°C/30-60°F) minimum contact time should be 4-7 days and stirring is recommended
- · Pectinase with protease side activities

Usage: Dilute SCOTTZYME COLOR PRO to approximately a 10% solution in cool water. Pour the solution over the crushed grapes or add directly to must and mix thoroughly. **Storage:** Store at 4° C (39°F) for 1-2 years. Keep tightly sealed and refrigerated once opened.

Recommended Dosage	
Crushed Grapes	60-100 mL/ton

1 kg (890 mL) – Item #16172* 25 kg (22.25 L) – Item #16162*

SCOTTZYME HC

Increase yield, clarity, and filterability

Add to:

Grapes, juice, or wine

Impact:

Clarification in American, hybrid, and non-grape wines

Format:

Liquid

Frequently used in Concord, Muscadine, Norton, hybrids, fruit wines, cider

SCOTTZYME® HC is a versatile enzyme that can be used throughout the fermented beverage process where it can increase yield, reduce solids, and improve filtration processes.

- Extremely beneficial for hard-to-press or slimy grapes (such as Concord), pome fruit (apple or pear), and stone (pitted) fruits
- HC is best used in conjunction with SCOTTZYME® PEC5L
- Optimal contact time is 3 days at 15° C (60°F). In cases when the tank temperature is cooler (-1-15°C/30-60°F), contact time should be 4-7 days and stirring is recommended
- Pectinase with cellulase side-activities

Usage: Dilute SCOTTZYME HC to approximately a 10% solution in cool water. Pour the solution over the crushed fruit or add to juice or wine during a tank mixing.

Storage: Store at 4° C (39°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Recommended Dosage-Bench trials recommended for wine		
Crushed Fruit	60-100 mL/ton	
Juice	5.3-7.9 mL/hL	200-300 mL/1000 gal
Wine	6.6-9.2 mL/hL	250-350 mL/1000 gal

1 kg (890 mL) – Item #16171* 25 kg (22.25 L) – Item #16161*

DID YOU KNOW?

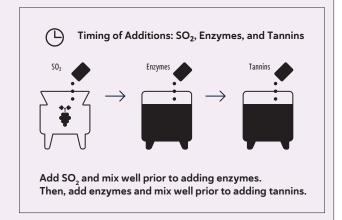
HOW TO USE ENZYMES WITH OTHER PRODUCTS

(SO₂, BENTONITE, TANNINS)

Sulfur Dioxide (SO_2): Enzymes are inhibited by SO $_2$. Deactivation occurs around 500 ppm. Do not add SO $_2$ and enzymes together. It is okay to add enzymes after the SO $_2$ is adequately dispersed or vice versa.

Tannins: If added together, tannins and enzymes may deactivate each other. It is okay to add tannins after the enzymes are adequately dispersed or vice versa.

Bentonite: Wait until the juice or wine has been racked off the bentonite to add enzymes. Bentonite inactivates enzymes. It is best to use bentonite after the enzyme treatment is complete.



SCOTTZYME KS

Improved settling and filterability in grape juice and wine

Add to:

Juice (white or rosé) or wine (all wines)

Impact:

Filtration, clarification

Format:

Liquid

Frequently used in difficult-to-settle or hard-to-filter juice or wine, cider

SCOTTZYME® KS can be used anytime post-pressing to increase clarification rates and improve filtration throughput.

- The earlier KS is used, the more effective it will be
- It should never be used before pressing in either white or red grapes: KS has very aggressive enzymatic activities that will break down skins and create many fine solids
- Customers have reported very favorable results when used to solve "nightmare" filtrations before bottling
- Minimum contact time is 3 days at 15°C (60°F). In cases when the tank temperature is cooler (-1-15°C/30-60°F), minimum contact time should be 4-7 days and stirring is recommended
- Blend of pectinase enzymes with cellulase, hemicellulase, and protease side activities

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. Storage: Store at 4°C (39°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Recommended Dosage—Bench trials recommended for wine		
White/Rosé Juice	2.6-4.0 mL/hL	100-150 mL/1000 gal
Wine	5.3-7.9 mL/hL	200-300 mL/1000 gal

1 kg (890 mL) - Item #16174* 25 kg (22.25 L) - Item #16164*

SCOTTZYME PEC5L

Improve pressability, clarification, and settling for white and fruit wines

Add to:

Grapes (white or rosé), juice (white or rosé), or wine (all wines)

Impact:

Clarification

Format: Liquid

Frequently used in whites, rosés, fruit wines, hybrids, cider

SCOTTZYME® PEC5L is a versatile enzyme that can be used at many winemaking stages. If added directly to grapes it can enhance pressabiliy and increase yield. When added to juice it decreases turbidity and improves settling.

- · Use on crushed grapes for easier pressing
- · Increases juice yields
- Improved settling and clarification
- Improves post-fermentation processing, including filtration
- Also useful for berries, pome, and stone fruits and should be used in conjunction with SCOTTZYME® HC
- Optimal contact time is 3 days at 15°C (60°F). In cases when the tank temperature is cooler $(-1-15^{\circ}\text{C}/30-60^{\circ}\text{F})$, contact time should be 4-7 days and stirring is recommended
- · Highly concentrated pectinase

Usage: Dilute SCOTTZYME PEC5L to approximately a 10% solution in cool water. Pour over the grapes or fruit before pressing or add to juice or wine during a tank mixing. **Storage:** Store at 4°C (39°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Recommended Dosage—Bench trials recommended for wine		
Crushed Grapes	10-20 mL/ton	
Juice	1.0-1.3 mL/hL	40-50 mL/1000 gal
Wine	1.3-1.6 mL/hL	50-60 mL/1000 gal

1 kg (890 mL) - Item #16170* 25 kg (22.25 L) - Item #16160*

FRUIT & MEAD

SCOTTZYME SPECTRUM

Concentrated formulation for fast throughput, improved filtration efficiency, and crossflow "cleaning"

Add to:

Red, white, or rosé wine

Impact:

Filtration, clarification

Format:

Liquid

Frequently used in finished wines and ciders that are difficult to clarify and filter

 $SCOTTZYME^{\otimes}$ SPECTRUM was created for use in fermented beverages that are very difficult to clarify.

- Highly concentrated blend of pectinase enzymes with cellulase, hemicellulase, and protease side activities
- SPECTRUM should be used on finished wine or cider only, either to assist with settling or to help with filtration issues before bottling
- Minimum contact time is 3 days at 15° C (60°F). In cases when the tank temperature is cooler (-1-15°C/30-60°F), minimum contact time should be 4-7 days and stirring is recommended

Warning: Never use SCOTTZYME SPECTRUM before pressing or on juice. It is our most aggressive enzyme and may result in over-clarification of juice, leading to fermentation difficulties.

Usage: Dilute SCOTTZYME SPECTRUM to approximately a 10% solution in cool water. Add to the wine after alcoholic fermentation during a tank mixing.

Storage: Store at 4°C (39°F) for 1–2 years. Keep tightly sealed and refrigerated once opened.

Recommended Dosage Bench trials recommended			
Fruit	Not recommended		
Juice	Not recommended		
Wine	4 mL/hL	150 mL/1000 gal	

1 kg (890 mL) - Item #16177*

25 kg (22.25 L) - Item #16167*

DID YOU KNOW?

HOW TO ADD ENZYMES (liquid or granular)

Whether liquid or granulated, enzymes must be diluted in water to effectively disperse onto grapes or into juice and wine.

For liquid enzymes: first calculate the dosage then dilute the enzyme to approximately a 10% solution (v/v) in cool water. 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

100 mL cylinder

90 mL H2O

10 mL enzyme

For example, to dose one ton of grapes with a 10 mL/ton dosage, mix 10mL of liquid enzyme with approximately 90 mL of water.

For granular enzymes: Granular enzymes need to be dissolved in 10 times their weight of water (for every gram of enzyme dissolve in approximately 10 mL water), gently stirred and allowed to sit for a few minutes. They are then ready to be added to juice or wine. Thorough mixing is important.

Granular enzymes should not be kept 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 SO₂.

ARTICLE

FRUIT & MEAD

ENZYMES CAN IMPROVE WINE QUALITY

ENZYMES CAN IMPROVE WINE COLOR AND STUCTURE

by increasing anthocyanin and tannin extraction in reds

The extraction and stabilization of color and structure molecules in red wines is a complex topic, but enzymes can play a role in improving both of these. Anthocyanins are the main compounds responsible for color in red wines. Anthocyanins are extracted from grape skins during fermentation and they are not inherently stable on their own. Their long-term stability in wine depends on their ability to form complexes with larger molecules, like tannins and polysaccharides. Enzymes can help increase color and color stability by increasing extraction of both anthocyanin and tannin*. While important in color stability and complexing, tannins are also a major contributor to wine structure.

Anthocyanins and tannins are located within the grape skins and can be released with macerating enzymes. These enzymes degrade grape skin cell walls and will facilitate the release of both compounds. Macerating enzymes specifically include those with cellulase and hemicellulase side activities, which break down cellulose and other structural polysaccharides1.

Enzyme preparations for color extraction and stabilization often have a mix of enzymatic activities. These enzyme activities are synergistic, not purely additive, such that gentle extraction of color, tannin, and other structure compounds can be achieved without overextraction. Overextraction can lead to bitterness, astringency, and harsh phenolics.

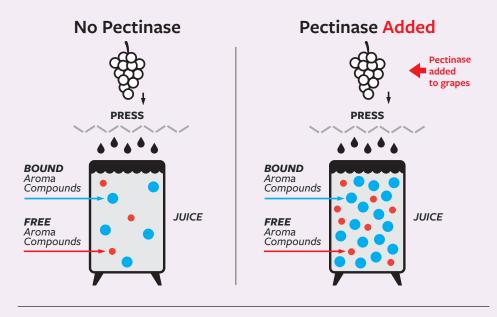
*It is worth noting that beyond concentration of anthocyanin and tannin, there are other factors that affect the success of forming stable anthocyanin complexes.

ENZYMES CAN IMPROVE WINE AROMA

by increasing varietal compounds

Aroma compounds are found in grape skins and the pectin layer immediately beneath the skins. Aroma compounds are either free (odor-active) or bound (odorless). Both types are extracted into juice via skin contact and/or pressing. Enzymes can help increase extraction of both free and bound aroma compounds and can also convert bound aromas into free aromas. Pectinases with β -glycosidase activity are well-suited to achieving both goals and can be used at multiple stages of the winemaking process.

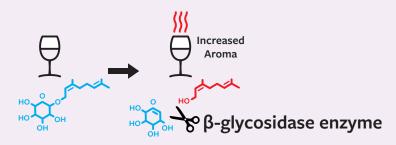
Pectinases are useful as pre-pressing, skin contact enzymes. They gently break down skins and the pectin layer, allowing more aroma compounds to be extracted during pressing. This action releases many types of free and bound aromas including terpenes, thiols, and norisoprenoids. Collectively, these compounds contribute to fruity, floral, citrusy, and spicy aromas that are part of a grape's varietal character.



Pectinase activity pre-pressing increases extraction of aroma compounds

β-glycosidase enzymes act upon bound aroma compounds which are odorless, converting them into the odor-active, free form. Specifically, terpenes and norisoprenoids are bound to sugars and can be released by β-glycosidase enzymes². This action is inhibited if glucose is > 50 g/L, so they work best after fermentation. Bound terpenes exist at much higher concentrations than free terpenes, so releasing them helps maximize the aromatic potential of the grape.

It is important to note that β -glycosidase activity will continue until inhibited (with a bentonite addition). These enzymes should be bench trialed or the wines closely monitored to determine the appropriate amount of enzyme action.



β-glycosidase activity post-fermentation releases bound aromas

ENZYMES CAN IMPROVE WINE TEXTURE

by increasing wine roundness

Polysaccharides are a class of molecules that broadly correlate to wine texture. Beneficial polysaccharides can be released into wine when yeast die and autolyze (break down). Thus, lees aging often leads to rounder, fuller-bodied wines.

β-glucanase enzymes will break down yeast cell walls, allowing faster release of polysaccharides which adds mid-palate and boosts mouthfeel. Further degradation of the yeast will also lead to release of peptides and nucleotides, which can increase savory or sweet characters. β-glucanases can also assist with filtration problems, particularly those related to Botrytis infection.

CHOOSING ENZYMES

For assistance choosing and using enzymes from our portfolio, see "Quick Guide to Choosing Enzymes" on pgs 100-101 and the in-depth product descriptions on pgs 102-107.

CITATIONS

- 1. Mojsov, K., Andronikov, D., Janevski, A., Jordeva, S., & Zezova, S. (2015). En- 2. Liu, J., Zhu, X.-L., Ullah, N., & Tao, Y.-S. (2017). Aroma glycosides in zymes and wine: The enhanced quality and yield. Savremene Tehnologije, 4(1), 94-100. https://doi.org/10.5937/savteh1501094m
 - grapes and wine. Journal of Food Science, 82(2), 248-259. https://doi. org/10.1111/1750-3841.13598



Call us crazy, but we are genuinely excited about fining and stability!

We have a curated portfolio of products that we love from suppliers we trust. We are committed to providing the best product and process knowledge for all fining and stability challenges. If your juice or wine has mystery hazes, troubles with oxidation, nightmare filtrations, or you simply want to improve your current practices, we're here to help.



Fining and stabilizing are complementary actions that treat and prevent off-odors, off-colors, unsightly hazes, and precipitates.

Fining products bind with unwanted elements and physically **remove** them from juice and wine. **Stability products** react with substances to **prevent** wine hazes and precipitates from occurring. A properly fined, stabilized, and filtered wine makes for a bottle-stable wine.

BENEFITS OF FINING & STABILITY AGENTS IN JUICE AND WINE

IMRPOVE CLARIFICATION	High solids can be problematic: they can cause off-odor production during fermentation, and they can make filtration difficult. A variety of fining agents including bentonite, chitosan, gelatin, and isinglass can be used for clarification.
TREAT AND PREVENT OXIDATION ISSUES	Oxidative damage in juice and wine is responsible for browning, loss of varietal aroma, and bruised apple/sherry off-aromas. The conditions leading to oxidative damage are not always understood, but treating problems early is always encouraged. Fining agents such as PVPP, casein, chitosan, and carbon can help treat and prevent oxidation issues.
SENSORY IMPROVEMENT	Fining agents can reduce astringency and bitterness (gelatin), counteract moldy and other unwanted aromas (carbon, PVPP, casein, certain chitosan formulations), and unmask some positive aromatics (gelatin).
COLLOIDAL STABILITY	"Colloids" are a broad class of compounds in wine that can cause a variety of hazes and precipitates, including protein hazes, potassium tartrate crystals, and polyphenol and polysaccharide precipitates. Fining and stability agents can treat and prevent these issues, leading to colloidal stability:
& HAZE PREVENTION	 Fining agents can treat and prevent hazes due to heat unstable proteins (bentonite), residual fining aids (silica gel), etc.
	 Stability agents can broadly target and stabilize many colloidal compounds (gum arabic and mannoproteins), or they can have specific targets (potassium tartrate inhibitors)

THE ROLE OF FINING & STABILITY IN THE WINEMAKING PROCESS

Throughout the winemaking process, fining and stability agents work with enzymes and filtration to produce a bottle-stable wine without off-aromas, off-flavors, and visual flaws. Using enzymes makes using fining/stability more efficient. Furthermore, using enzymes and fining/stability agents makes filtration more efficient.



QUICK GUIDE TO CHOOSING FINING & STABILITY AGENTS

	CRISTALLINE PLUS	INOCOLLE	NACALIT PORE-TEC	QI'UP XC	CASÉINATE DE POTASSIUM	BENTOLACT S	FRESHPROTECT	POLYCACEL	POLYCEL	[xo]on	BLANCOBENT UF	FERMOBENT PORE-TEC	GRANUBENT PORE-TEC
Pg	121	120	115	118	116	116	116	117	117	118	114 Protei	115 n Stability	115 (Heat
		Clarifi	cation			Treat an	d Prevent	Oxidative	Damage		riotei	Stability)	(Heat
Primary Use	Clarification in wines with low solids, adds "brilliance"		Clarification			Treat and prevent oxidative	ad de La company		Removes color and browning induced by oxidation	Treat and prevent oxidative damage	Efficient protein removal compatible with crossflow applications	Early protein removal during fermentation	Protein removal
Secondary Uses		Unmask positive aromatics	Compaction of lees Protein removal		Counteract moldy aroma Diminish bitterness	Reduce sulfur off odors Counteract moldy aromas	Diminish bitterness and herbaceousness	Freshen aromas Diminish bitterness	Diminish bitterness and herbaceousness	Counteract moldy aromas Diminish bitterness		Compaction of primary lees	Clarification
Formulation	Isinglass	Gelatin	Bentonite	Chitosan	Casein	Bentonite-Casein blend	Bentonite-PVPP blend	PVPP-Casein blend	РУРР	Chitosan	Bentonite	Bentonite	Bentonite
Stage of Winemaking	Wine	Juice, Wine	Juice, Wine	Juice, Flotation, Wine	Juice, Wine	Juice, Wine	In press, Juice, Wine	Juice, Wine	Fermentation, Wine	In press, Juice, During fermentation, Wine	Wine, Immediately Pre-bottling	During fermentation	Wine

^{*}Many of these products solve similar issues. However, wine is a complicated matrix and may react better to certain product formulations. We highly recommend performing trials with these products to determine what will work best for your wine.

QUICK GUIDE TO CHOOSING FINING & STABILITY AGENTS

CLARISTAR	FINAL TOUCH GUSTO NEW	FINAL TOUCH TONIC NEWS	FLASHGUM R LIQUIDE	PURE-LEES DELICACY XXEWS	PURE-LEES ELEGANCY NEW	PURE-LEES LONGEVITY	ULTIMA SOFT	COLLE PERLE	GELOCOLLE	GRANUCOL FA	GRANUCOL GE
121	122	122	122 Colloidal	123 Stability	123	124	124	119	120 Misc	114 Goals	114
Confers potassium tartrate stability			Consider	Confers colloidal stability				Removal of astringency and bitterness in red wines	Aids settling and prevents overfining (haze due to residual fining agent)	Decolorization	Deodorization
Enhance perception of sweetness and softness	Improves roundness	Protects aroma compounds, prevents pre- mature aging	Enhance perception of sweetness and softness	Softens harsh tannin, in- creases fruit intensity	Removes harsh tannin, increases roundness	Scavenges oxygen	Enhance perception of sweetness and improves roundness	Clarification	Compaction of lees		
Mannoprotein	Mannoprotein	Mannoprotein	Gum arabic	Mannoprotein	Mannoprotein	Mannoprotein	Mannoprotein-gum arabic	Gelatin	Silica gel	Activated Carbon	Activated Carbon
Immediately prior to bottling	Immediately prior to bottling	Immediately prior to bottling	Immediately prior to bottling	Wine	Wine	Wine	Immediately prior to bottling	Wine	Flotation, Wine	In press, Juice, Wine	In press, Juice, Wine

Carbon with decolorizing properties Stage of Winemaking: Juice or wine

GRANUCOL FA

Juice or wine

Contact Time:
24 hours

Impact: Removes color

Frequently used in reds, whites, rosés, fruit wines, cider

Activated Carbon

GRANUCOL® FA is used to eliminate unwanted color in juice and wine.

- Can help remove brown pigments due to oxidation
- · Can reduce red pigments in rosé juice and wine
- Activated carbon in pellet form
- Easy to use

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.

 $\textbf{Storage:} \ \ \text{Dated expiration.} \ \ \text{Store in a dry, odor-free and well-ventilated environment below 25°C (77°F).} \ \ \ \text{Reseal opened packaging immediately.}$

Recommended Dosage - Bench trials recommended					
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		

1 kg - Item #15331*

10kg - Item #15334*

GRANUCOL GE

ERBSLÖH

€RBSLÖH

Carbon with deodorizing properties

Stage of Winemaking: Juice or wine

Contact Time: 24 hours

Impact:
Removes off-odors and flavors

Frequently used in reds, whites, rosés, fruit wines, cider

GRANUCOL® GE is used to absorb off-aromas and off-flavors.

- Especially useful in removing moldy aromas from grapes contaminated with rot
- Activated carbon in pellet form
- Easy to use

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.

Recommended Dosage - Bench trials recommended					
Juice	100-1000ppm	10-100 g/hL	0.83-8.3 lb/1000 gal		
Wine	100-600 ppm	10-60g/hL	0.83-5.0 lb/1000 gal		

1 kg - Item #15332*

10kg - Item #15333*

Bentonite

BLANCOBENT UF

ERBSLÖH

Bentonite for use during crossflow filtration

Stage of Winemaking: Pre-crossflow filtration (wine)

Contact Time: During crossflow

Impact: Removes proteins

Frequently used in reds, whites, rosés







BLANCOBENT UF is a highly purified powdered bentonite allowing for 1-step protein stabilization and crossflow filtration.

- Compatible for direct dosing into symmetrical hollow fiber membrane cross-flow systems
- Powdered formulation is free of crossflow damaging sand and grit
- Does not cause excessive abrasion to symmetrical hollow fiber crossflow membranes due to the lack of large, abrasive particles
- Can be prepared in room temperature water
- Always consult your crossflow manufacturer prior to use (approved for use with Pall Oenoflow system)
- Not recommended for use on wines that will not be crossflow filtered—use GRANUBENT PORE-TEC or NACALIT PORE-TEC depending on goals

Usage: Add BLANCOBENT UF to wine up to 12 hours prior to crossflow filtration. To prepare BLANCOBENT UF: add slowly to approximately 10 times its weight of room temperature 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.

Recommended D	<i>osage</i> - Bench trial:	s recommended	
Wine	200-2000 ppm	20-200 g/hL	1.6-16.8 lb/1000 gal

25 kg - Item #15320*

FERMOBENT PORE-TEC

ERBSLÖH

Bentonite for use during fermentation

Stage of Winemaking: Fermentation

Contact Time:

During fermentation

Impact: Removes proteins

Frequently used in Sauvignon blanc, Gewürztraminer, early to bottle aromatic whites and rosés FERMOBENT® PORE-TEC is used during fermentation to remove heat unstable proteins.

- May eliminate the need for post-fermentation protein stabilization
- Preferred addition timing is mid-fermentation
- Improves the release of CO₂ during fermentation
- Highly purified and has extremely low heavy metal content (iron)
- Varietal aromas are preserved compared with traditional post-fermentation bentonite additions
- Helps compact fermentation lees
- Produced using PORE-TECnology resulting in an almost dust-free bentonite
- Can be prepared in room temperature water
- · Highly purified sodium-calcium based bentonite

Usage: Add FERMOBENT PORE-TEC slowly to approximately 5 times its weight of room temperature water and allow to swell. Allow a rest period of 4–6 hours. Dispose of supernatant and add remaining bentonite slurry to the juice or wine while thoroughly mixing. After fermentation, rack off 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.

Recommended Dosage - Bench trials recommended					
Fermenting Ju ice	500-3000 ppm	50-300 g/hL	4.2-25 lb/1000 gal		
5 kg = Item #15321* 20kg = Item #15323*					

GRANUBENT PORE-TEC



Bentonite for general protein stability

Stage of Winemaking:

Juice or wine

Contact Time: 1-7 days

Impact:

Removes proteins

Frequently used in reds, whites, rosés





GRANUBENT PORE-TEC is cleaner and more uniform than other bentonites.

Competitor Rentonite

GRANUBENT PORE-TEC is a general-purpose bentonite for protein stabilization that can be used in juice or wine.

- Refined and easy-to-use formulation
- Can help clarify due to the removal of solids
- Produced using PORE-TECnology resulting in an almost dust-free bentonite
- · Can be prepared in room temperature water
- · Highly purified sodium-based bentonite

Usage: Add GRANUBENT PORE-TEC slowly to approximately 10 times its weight of room temperature water under constant stirring. Let the mixture swell for 4–8 hours. Dispose of supernatant and add remaining bentonite slurry to the juice or 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.

Recommended Dosage - Bench trials recommended				
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	

20 kg – Item #15325*

NACALIT PORE-TEC



Bentonite for clarification

Stage of Winemaking: Juice or wine

Contact Time:

1-7 days

Impact:

Clarification and compaction of lees

Frequently used in reds, whites, rosés, fruit wines, cider, mead

NACALIT® PORE-TEC is specifically formulated for instances where superior flocculation, adsorption, and clarification are required.

- Helps to compact lees
- Produced using PORE-TECnology resulting in an almost dust-free bentonite
- Can be prepared in room temperature water
- Highly purified sodium-calcium bentonite

Usage: Add NACALIT PORE-TEC slowly to approximately 5–10 times its weight of room temperature water under constant stirring. Allow to swell for a minimum of 4–12 hours. Dispose of supernatant and add remaining bentonite slurry to the juice or wine while thoroughly mixing.

 $\textbf{Storage:} \ \ \text{Dated expiration.} \ \ \text{Store in a dry, odor-free and well-ventilated environment below 25°C (77°F).} \ \ \ \text{Reseal opened packaging immediately.}$

Recommended Dosage - Bench trials recommended					
50-1500 ppm	50-150 g/hL	4.2-12.6 lb/1000 gal			

5 kg - Item #15322*

20kg - Item #15324*

Casein and/or PVPP

BENTOLACT S



Bentonite-casein blend for the preventative treatment of oxidation and removal of off-odors

Stage of Winemaking:

Juice, wine (pre-protein stabilization)

Contact Time:

1-2 weeks

Impact:

Treatment and prevention of oxidation, cleans up off odors and flavors

Frequently used in whites, rosés, fruit wines, cider

BENTOLACT S is most commonly used to prevent and treat oxidation.

- Can be used in juice or wine, but is most effective when used early in the winemaking process
- · Can help clean up moldy fruit
- Can help to remove volatile sulfur off-odors
- Can help to remove bitter characters
- · Assist with clarification
- · Proprietary IOC blend of soluble casein and bentonite

Usage: Suspend 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 pumpover or a good mixing. BENTOLACTS additions may take up to 7 days to settle. Use BENTOLACTS the same day it is hydrated. Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended 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		

5 kg - Item #15788*

CASÉINATE DE POTASSIUM **® 100**



Casein to help prevent oxidation and remove oxidized components

Stage of Winemaking:

Juice, wine (pre-protein stabilization)

Contact Time:

1-2 weeks

Impact:

Treatment and prevention of oxidation

Frequently used in whites, rosés, fruit wines, cider

CASÉINATE DE POTASSIUM is used for the treatment of oxidized phenolics and bitter compounds.

- Helps freshen wine and reveal muted aromas
- · Can counteract moldy aromas
- Can help to minimize bitter characters
- Proprietary IOC formulation which contains potassium to help with solubility

Usage: Suspend 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 POTASSI-UM can float. Once hydrated, CASÉINATE DE POTASSIUM should be used within 2 hours.

Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended 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		

5 kg - Item #15808*

FRESHPROTECT



Bentonite-PVPP blend for the treatment of oxygen-sensitive juice and wine

Stage of Winemaking:

Juice, wine (pre-protein stabilization)

Contact Time:

1-2 weeks

Impact:

Softens wine and removes oxidized characters

Frequently used in whites, rosés, fruit wines, cider

FRESHPROTECT is used to remove oxidized characters, bitterness, and herbaceousness in both juice and wines.

- Especially useful in the treatment of hard-press fractions where it reduces aggressiveness and reveals fruit
- Proprietary IOC blend of polyvinylpolypyrrolidone (PVPP), bentonite, and cellulose with gum arabic added as a processing aid
- Must be removed from wine via filtration per TTB regulations due to the PVPP portion

Usage: Suspend 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

Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended Dosage - Ber	nch trials recommended for wi	ne
200-1000 ppm	20-100 g/hL	1.7-8.3 lb/1000 gal

5 kg - Item #15791*

MICRO CONTROL

POLYCACEL

∂ IOC

PVPP-Casein blend for the preventative treatment of browning and pinking

Stage of Winemaking:

Juice, wine (pre-protein stabilization)

Contact Time: 10-21 days

Impact:

Treatment and prevention of oxidation, freshens aromas

Frequently used in whites, rosés, fruit wines, cider

POLYCACEL is useful for removing phenolic compounds associated with browning and pinking.

- Can reduce bitterness and reveal hidden aromas
- Can be used to treat oxidized juice and wine
- Proprietary IOC blend of polyvinylpolypyrrolidone (PVPP), micropulverized cellulose, and casein
- Must be removed from wine via filtration per TTB regulations due to the PVPP portion

Usage: Suspend 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. Use POLYCACEL the same day it is hydrated.

Storage: Dated expiration. Store in a dry, odor–free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended 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

1 kg - Item #15785*

5 kg - Item #15786*

POLYCEL



PVPP for the treatment of browning

Stage of Winemaking: Juice, wine (pre-protein stabilization)

Contact Time:1-2 weeks

Impact: Treatment and prevention of oxidation, removal of bitter compounds

Frequently used in whites, rosés, cider, young reds

POLYCEL was formulated to help prevent and/or treat compounds that cause pinking and browning.

- Can also be used to treat bitterness and herbaceousness
- Can bind color molecules and small phenolic compounds (catechins); therefore, it is best to use in young wines
- · Blend of polyvinylpolypyrrolidone (PVPP) and cellulose
- Must be removed from wine via filtration per TTB regulations due to the PVPP portion

Usage: Suspend 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. **Storage:** Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately

Recommended Dosage - Bench trials recommended for wine			
Juice	400-800 ppm	40-80 g/hL	3.3-6.7 lb/1000 gal
Wine (Prevention)	150-300 ppm	15-30 g/hL	1.25-2.5 lb/1000 gal
Wine (Treatment)	300-500 ppm	30-50 g/hL	2.5-4.2 lb/1000 gal

1 kg - Item #15784*

Chitosan

NO[OX]



Chitosan-bentonite blend to remove oxidized characters in juice and wine; non-animal alternative to case in

Stage of Winemaking: Any stage

Contact Time:

Juice 16 hours minimum Wine 1-2 weeks

Impact:

Treatment and prevention of oxidation, freshens aromas, reduces herbaceousness and bitterness

Frequently used in whites, rosés, fruit wines, cider

NO[OX] is a non-animal, non-allergenic, versatile fining agent that can be used to remove undesirable aromas and oxidized compounds.

- Can be used during juice settling to clean up mold-damaged or herbaceous fruit
- · Can be added during fermentation to remove herbaceous and bitter notes
- When used post-fermentation it can remove oxidized characters including color, aromas, and flavors
- Wines have a brighter color and increased aromatic freshness
- · Lees are compacted, and loss is minimized
- NO[OX] is an innovative and highly specialized chitosan-bentonite based fining agent
- Although new to the Scott Labs portfolio, NO[OX] has been successfully used in other countries since 2010. This animal-free, non-allergenic fining agent is a viable alternative to casein

Usage: Slowly add NO[OX] in 10 times its weight of clean, chlorine-free water, mixing constantly until suspension is homogeneous. There must be no lumps in the suspension. Depending on amount of NO[OX] to rehydrate this can take up to one hour. NO[OX] is insoluble, so it is essential that solution is mixed during addition. Rack once lees are well settled.

Storage: Dated expiration. Store away from light and in a dry, odor-free environment below 25° C (77°F). Once opened, use immediately.

Note: Chitosan for the use of clarification is listed by the TTB in 27 CFR 24.250 but not on 27 CFR 24.246. For more information, please visit TTB.gov.

Recommended Dosage - Bench trials recommended for wine			
Juice	300-800 ppm	30-80 g/hL	2.5-6.7lb/1000 gal
Wine	200-600 ppm	20-60 g/hL	1.67-5.0 lb/1000 gal

5 kg - Item #16421*

QI'UP XC



Chitosan for superior clarification; non-animal alternative to gelatin

Stage of Winemaking:

luice or wine

Contact Time:

Until juice lees cap forms during flotation (2-4 hours depending on juice volume and conditions and size and shape of tank), or until target solids level reached during static settling

Impact:

Superior clarification

Frequently used in whites, rosés, fruit wines, cider, mead

QI'UP XC is used for clarification, even in difficult conditions.

- Animal-free, non-allergenic specialized preparation of chitosan, activated with tartaric acid
- Viable alternative to gelatin for juice and wine clarification
- The tartaric acid portion results in a high surface charge that allows for the rapid aggregation of solid particles
- This innovative floccing agent can also be used for juice flotation
- When used during flotation the juice must not have started fermentation, it must be pectin–free (try 3–4 mL/hL SCOTTZYME® PEC5L), and temperature should be >13°C (55°F)
- To aid in lees/cap compaction during settling and flotation, QI'UP XC should be used in conjunction with bentonite. We recommend 10-30 g/hL of NACAL-IT® PORE-TEC

Usage: Add QI'UP XC in 10 times its weight of clean, chlorine-free water, mixing constantly until suspension is homogeneous. Stir to maintain suspension during addition.

Storage: Dated expiration. Store away from light and in a dry, odor-free environment below 25° C (77°F). Once opened, use immediately.

Note: Chitosan for the use of clarification is listed by the TTB in 27 CFR 24.250 but not on 27 CFR 24.246. For more information, please visit TTB.gov.

Recommended Dosage - Bench trials recommended for wine		
30-100 ppm	3-10 g/hL	0.25-0.83 lb/1000 gal

1 kg - Item #16430*

REPLACING ALLERGENIC AND ANIMAL-BASED FINING AGENTS

Many common fining agents are derived from animal sources including gelatin (from livestock), casein (from milk), and more. These fining agents are effective because they contain proteins that have a propensity to bind with solids and other undesirable compounds in wine.

While these products have been safely used in many food and beverage applications for centuries, evolving consumer preferences have caused winemakers to look for alternatives. Milk, and therefore casein, is considered a major food allergen and animal-derived gelatins are of concern to those subscribing to vegan and vegetarian diets. Fortunately, there are non-animal-based alternatives to gelatin and casein.

WHAT ARE GELATIN & CASEIN USED FOR?

Gelatin is commonly derived from the hydrolysis of pig or other animal collagens. It is used for clarification, reducing astringency/bitterness, and removing some off-aromas.

Casein is derived from milk. It is used to treat and prevent oxidative damage (including browning/pinking), counteract moldy aromas, and diminish bitterness.

CHITOSAN AS AN ALTERNATIVE

Chitosan can replace both gelatin and casein depending on the chitosan formulation. Chitosan is derived through the deacetylation of chitin which is naturally produced by many living organisms and is the second most abundant polysaccharide on earth after cellulose. Depending on the preparation, chitosan can vary in degree of deacetylation, thus impacting the molecules' ionic charge, molecular weight, and solubility. By changing one or more of these properties, the functionality of the chitosan molecule changes, thereby changing the winemaking application.

GELATIN → QI'UP XC

QI'UP XC is a chitosan-based clarification agent that can be used *instead of gelatin*. This formulation for clarification has strong positive charges to promote flocculation and destabilization of colloids which increases clarification rates. QI'UP XC is blended with tartaric acid to allow it to carry an even higher charge, further increasing clarification efficiency.

CASEIN → NO[OX]

NO[OX] is an effective chitosan-based antioxidant and can be used *instead of casein* to treat and prevent oxidative damage, preserving color and aroma.

This formulation for antioxidative activity blocks the formation of free radicals via direct scavenging or via indirect means through metal ion (iron and copper) chelation. This means that the oxidation cascade is blocked, and browning is minimized. Chitosan is also thought to inhibit browning due to absorption of oxidized phenolic compounds or by coagulation of suspended solids to which polyphenol oxidases are bound.

Gelatins

COLLE PERLE



Gelatin for the treatment of astringent wines

Stage of Winemaking: Wine (pre-bentonite addition)

> Contact Time: 1 week

Impact:

Removal of bitter and astringent compounds, clarification

Frequently used in reds, whites, rosés, fruit wines, cider, mead

COLLE PERLE is used to soften bitter and astringent tannins.

- Can help with clarification
- Flocculates and settles well, especially when used in conjunction with the silica
- Particularly useful for young wines or hard-press fractions
- · Hydrolyzed gelatin solution

Usage: 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. COLLE PERLE can be used in conjunction with GELOCOLLE to improve settling or prevent overfining (see pg 128 for directions).

Storage: Dated expiration. Store in a dry, odor–free and well-ventilated environment below 25°C (77°F). Once open use immediately.

Recommended Dosage - Bench trials recommended		
800-1500 ppm	80-150 mL/hL	3.0-5.7 L/1000 gal
1 L – Item #15798*	5 L – Item #15799*	20 L – Item #15800*

FRUIT & MEAD

INOCOLLE

7 IOC

Gelatin for improving clarity and aromas

Stage of Winemaking: Juice, wine (pre-bentonite addition)

Contact Time:

1 week

Impact:

Clarification and aroma revelation

Frequently used in reds, whites, rosés, fruit wines, cider

INOCOLLE is a multi-purpose gelatin that is equally useful in juice and wine for clarification and improving aromas.

- Can be used for clarification in white and rosé wines, resulting in improved brilliance and suppleness
- In red wines, it can improve the aromas and flavors of the finished wine
- · Can remove colloidal and unstable material
- It is particularly useful for juice fining and flotation
- · Flocculates and settles well, especially when used in conjunction with the silica gel GELOCOLLE
- Partially hydrolyzed gelatin solution

Usage - Juice: Dilute INOCOLLE 1:1 in water. Introduce into juice gradually while mixing vigorously to ensure even treatment. Racking should be done after 1 week.

Usage - Wine: Dilute INOCOLLE 1:1 in water. Introduce into wine gradually while mixing to ensure even treatment. Racking should be done after 1 week. Filtration is possible 48-72 hours after treating with INOCOLLE. 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. INOCOLLE can be used in conjunction with GELOCOLLE to improve settling or prevent overfining (see pg 120 for directions).

Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
300-1000 ppm 30-100mL/hL 1.1-3.8 L/1000 gal		1.1-3.8 L/1000 gal	
1 L – Item #15795* 5 L – Item #15796*			

Silica Gel

GELOCOLLE



Silica gel to prevent overfining

Stage of Winemaking:

Wine

Contact Time: 1-2 weeks

Impact:

Aids settling, compaction of lees

Frequently used in whites, rosés, fruit wines, cider

GELOCOLLE reduces the risk of leaving residual protein-based fining agents behind (overfining), particularly in low tannin wines.

- Initiates the flocculation of fining agents
- Speeds up clarification
- · Helps compact lees
- · Can be used in hard-to-filter wines where it chelates proteins and other compounds, facilitating filtration throughput
- Negatively charged solution of suspended silica that can be used alone or in conjunction with INOCOLLE, COLLE PERLE, CRISTALLINE PLUS, or other protein-based fining agents.

Usage: GELOCOLLE can be used alone or in concert with other fining agents. To aid in settling GELOCOLLE should be added directly to wine 1 hour before the addition of protein-based fining agents (gelatin, isinglass, etc.). To prevent overfining GELOCOLLE should be added directly into wine 1 hour after the addition of protein-based fining agents (gelatin, isinglass, etc.). Post-addition, the vessel should be mixed thoroughly.

Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment 10-20°C (50-68°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.

Recommended Dosage - Bench trials recommended		
200-1000 ppm	20-100 mL/hL	0.75-3.8 L/1000 gal

5 L - Item #15783*

Isinglass

CRISTALLINE PLUS



Isinglass to assist with clarification and brightening

Stage of Winemaking: Wine (pre-bentonite addition)

Contact Time: 2-4 weeks

Impact: Clarification

Frequently used in light reds, whites, rosés, fruit wines, cider

CRISTALLINE PLUS can improve clarity and filterability even in difficult-to-filter wines (e.g., wines made with botrytized grapes).

- Generally used in white and rosé wines to increase brilliance
- It is favored by Pinot noir winemakers due to its gentle fining effect and brightening of aromas
- Wine reacts more favorably to the clarifying effects of CRISTALLINE PLUS when the initial solid levels are relatively low
- CRISTALLINE PLUS is not sensitive to cold temperatures but may be slow to complete settling; co-fine with GELOCOLLE (pg 120) for faster settling
- · Blend of isinglass and citric acid stabilized with potassium metabisulfite

Usage: Dissolve CRISTALLINE PLUS in 150-200 times its weight of tepid water ($15-20^{\circ}$ C ($59-68^{\circ}$ 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.

Recommended Dosage - Bench trials recommended			
15-30 ppm	1.5-3 g/hL	0.12-0.25 lb/1000 gal	
100 g – Item #15770*	1 kg – Item #15771*		

Mannoproteins & Gum Arabics

Mannoproteins are components of yeast cell walls and are released during alcoholic fermentation and aging. Mannoproteins are known to confer potassium tartrate and protein stability, reduce astringency, improve color, and improve wine texture, softness, and roundness.

The mannoproteins of different *Saccharomyces* strains vary in composition and molecular weight, which affects their properties in wine. Even though the mannoprotein products in our portfolio have the same basic composition and all confer colloidal stability, they all have unique secondary impacts based on the strains they were prepared from.

CLARISTAR



Mannoprotein preparation for potassium tartrate stabilization

Stage of Winemaking: Pre-bottling

Requires Racking:

No

Impact:

Inhibits potassium tartrate precipitation

Frequently used in reds, whites and rosés that meet the following criteria:

- Wine is the final blend
- Has never been pH adjusted with calcium carbonate
- Are confirmed protein stable
- Are under 16% ABV

CLARISTAR® is a yeast-based liquid mannoprotein to assist with potassium tartrate stability in wine.

- Inhibits potassium tartrate drop-out in compatible wines
- Improves colloidal stability
- Enhances the sensory balance of wine and users note improved aromatics as well as smoothness on the palate
- Highly purified liquid solution of mannoproteins with the highest Tartrate Stability Index (TSI)
- 100% soluble in wine
- Bench trials must be run to determine a wine's compatibility with CLARISTAR (contact us for more information)
- Compatible wines can be treated immediately prior to bottling
- Mannoproteins have some stabilizing effects on wine, though the addition of this
 product is not a replacement for good winemaking practice or thorough analysis
- Not for use in sparkling or sparkling base wine

Usage: CLARISTAR should be the last commercial product added to the wine. Add directly to wine and mix. CLARISTAR should never be added prior to filtration with cellulose pads or DE/Earth/Velo filtration, however, it can be added prior to crossflow and sterile cartridge filtration.

Storage: Dated expiration. Store in a cool, dry environment under 10° C (50° F). Once opened, use within 15 days. Can be frozen once.

Note: CLARISTAR is not appropriate for calcium tartrate stabilization.

Recommended Dosage - Bench trials recommended		
600-1250 ppm	60-125 mL/hL	2.27-4.7 L/1000 gal

2.5 L - Item #17000*

20 L - Item #17001*

NEW

FINAL TOUCH GUSTO



Improves roundness and smoothness and can contribute to colloidal stability

Stage of winemaking:

Pre-bottling

Requires racking:

No

Impact:

Confers colloidal stability and improves wine quality

Frequently used in reds

FINAL TOUCH GUSTO® is a specialized preparation of liquid mannoproteins that improves roundness and smoothness and can contribute to colloidal stability.

- Astringency is reduced and the wine is smoother and rounder
- · Aroma intensity, freshness, and fruitiness are increased
- Completely soluble and can be added prior to final filtration

Usage: Add directly to the wine and mix. 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 cool, dry environment at $<10^{\circ}$ C (50°F). Once opened keep tightly sealed and use within four weeks.

Recommended Dosage - Be	nch trials recommended	
100-400 ppm	10-40 g/hL	0.83-3.3 lb/1000gal

1 L - Item #17032*

NEW

FINAL TOUCH TONIC



Protects aroma compounds, stabilizes colloids, can extend shelf-life in whites and rosés

Stage of winemaking: Pre-bottling

Requires racking:

No

Impact:

Confers colloidal stability and improves wine quality

Frequently used in whites, rosés

FINAL TOUCH TONIC® is a specialized preparation of liquid mannoproteins that prevents premature aging and preserves quality of white and rosé wines.

- Preserves freshness and prevents oxidative aromas
- · Wines are more aromatically intense
- Completely soluble and can be added prior to final filtration

Usage: Add directly to the wine and mix. 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 cool, dry environment at $<10^{\circ}$ C (50°F). Once opened keep tightly sealed and use within four weeks.

Recommended Dosage - Be	nch trials recommended	
200-400 ppm	20-40 g/hL	1.7-3.3 lb/1000gal

1 L - Item #17030*

FLASHGUM R LIQUIDE



Gum arabic for colloidal protection at bottling

Stage of Winemaking: Pre-bottling

Requires Racking: No

Impact:

Colloidal protection, sweetness

Frequently used in reds, whites, rosés, fruit wines, cider

FLASHGUM R LIQUIDE helps reduce the risk of colloidal deposits in bottled wine and cider.

- Protects color in reds, rosés, and fruit wines
- Gives perception of sweet and soft characters on the palate
- Reduces astringency and increases the perception of volume and fullness in the mouth
- Especially usefully in unfiltered wines, where it can minimize colloidal sediment
- Can be added 24-72 hours before bottling
- If filtering the wine post addition, ensure there will be no negative impact on filtration throughput
- Gum arabic derived from *Acacia seyal*
- Gum arabic has some stabilizing effects on wine, though the addition of this product is not a replacement for good winemaking practice or thorough analysis

 $\textbf{Usage:} \ FLASHGUM\ R\ LIQUIDE\ should\ be\ the\ last\ commercial\ product\ added\ to\ the\ wine.\ It\ is\ best\ to\ do\ inline\ additions\ 24-72\ hours\ prior\ to\ the\ final\ pre-membrane\ and\ membrane\ filtrations.\ Filterability\ trials\ prior\ to\ membrane\ filtration\ are\ recommended.\ If\ using\ on\ wine\ that\ is\ not\ going\ to\ be\ filtered,\ add\ FLASHGUM\ R\ LIQUIDE\ just\ prior\ to\ bottling.$

Storage: Dated expiration. Store in a dry, odor-free environment at or below 25°C (77°F).

Recommended Dosage - Bench trials recommended		
400-1200 ppm 40-120 mL/hL 1.5-4.5 L/1000 gal		

NEW

PURE-LEES DELICACY



Gently softens harsh tannin, increases fruit intensity, confers colloidal stability

Stage of winemaking:

End of alcoholic fermentation or pre-bottling

Contact Time:

Min. 2 days, no max. time

Requires Racking:

Yes

Impact:

Smooths wine and assists with colloidal stability

Frequently used in reds

PURE-LEES DELICACY™ is a yeast-based, highly reactive mannoprotein preparation that coats harsh tannins to soften mouthfeel, increases fruit expression, and assists with colloidal stability.

- Coats tannins leading to smoother wines
- Wines appear to have greater fruit expression
- Although primarily recommended for red wines, can be used in phenolic white and rosé wines
- · Preparation from a specific strain of enological yeast

Usage: Mix PURE-LEES DELICACY in 10 times its weight of water or wine. Stir gently then add to wine and mix thoroughly. Rack once lees are well-settled.

Storage: Dated expiration. Store in a cool and dry environment at 25°C (75°F). Once opened keep tightly sealed and dry.

Recommended Dosage - Bench trials recommended				
200-400 ppm	20-40 g/hL	1.7-3.3 lb/1000gal		

1 kg - Item #15276*

NEW

PURE-LEES ELEGANCY



Removes harsh tannin to increase roundness, confers colloidal stability

Stage of winemaking:

End of alcoholic fermentation or pre-bottling

Contact Time:

Min. 2 days, no max. time

Requires Racking:

Yes

Impact:

Removes harsh tannins and assists with colloidal stability

Frequently used in reds

PURE-LEES ELEGANCY™ is a highly reactive mannoprotein preparation that can help remove aggressive tannins, improve wine texture, and assist with colloidal stability.

- Fines out harsh tannins leading to less aggressive and bitter wines
- · Wine balance and mouthfeel is improved
- Increase in fruity notes
- Preparation from a specific strain of enological yeast

Usage: Mix PURE-LEES ELEGANCY in 10 times its weight of water or wine. Stir gently then add to wine and mix thoroughly. Rack once lees are well-settled.

Storage: Dated expiration. Store in a cool and dry environment at 25° C(75°F). Once opened keep tightly sealed and dry.

Recommended dosage - Bench trials recommended		
200-400 ppm 20-40 g/hL 1.7-3.3 lb/1000gal		

1 kg - 15278*

FRUIT & MEAD

PURE-LEES LONGEVITY



Scavenges oxygen, confers colloidal stability

Stage of winemaking:

End of alcoholic fermentation or pre-bottling

Contact Time:

Minimum 1 week

Requires Racking:

Yes

Impact:

Scavenges oxygen

Frequently used in whites, rosés, reds, cider

PURE-LEES LONGEVITY™ helps to increase shelf-life and protect color and aroma while also helping to stabilize colloids.

- · Due to high oxygen uptake capacity, it minimizes loss of fruit character and browning, which increases shelf-life
- Wines are reported to be fresher, fruitier and rounder
- Rapidly and irreversibly, scavenges up to 1 mg/L O
- Inspired by the practice of traditional lees aging, PURE LEES LONGEVITY will continue to scavenge oxygen until its capacity is exhausted
- Can replace SO₂ as an antioxidant in no- and low-SO₂ winemaking, though it is not a direct substitute for SO₂ as it has no antimicrobial activity
- PURE-LEES LONGEVITY was developed in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), France

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.

Recommended Dosage - Be		
200-400 ppm	20-40 g/hL	1.7-3.3 lb/1000gal

1 kg - 15249*

ULTIMA SOFT



Mannoprotein-gum arabic blend for colloidal protection at bottling

Stage of Winemaking: Pre-bottling

Requires Racking: No

Impact:

Balancing and softening

Frequently used in reds, whites, rosés, fruit wines, cider

ULTIMA SOFT is used to stabilize colloids and can improve wine balance.

- · White wines appear softer with enhanced body, added length, and lower levels of astringency
- · Red wines appear to have more fruity aromas and a rounder, fuller midpalate
- Fully soluble and can be added 24-72 hours prior to bottling
- If filtering the wine post addition, ensure there will be no negative impact on filtration throughput
- Unique blend of mannoproteins and gum arabic
- Both gum arabic and mannoproteins have some stabilizing effects on wine, though the addition of this product is not a replacement for good winemaking practice or thorough analysis

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

Recommended Dosage - Bench trials recommended		
150-300 ppm	15-30 g/hL	1.2-2.4 lb/1000 gal

1 kg - Item #17012*

PROTOCOL

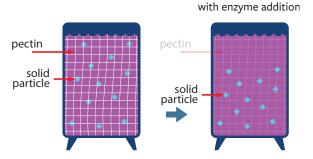
BEST PRACTICES FOR SETTLING WITH FINING AGENTS

Static settling is the most common method of using and removing fining agents. Agents are added to a tank, the tank is mixed, and the agent settles over time, binding and removing solids and other undesired compounds. Scott Laboratories recommends the following order of operations: 1st Add Enzymes; 2nd Add Fining Agent(s); 3rd Allow Time to Settle

ADD ENZYMES

Enzymes break down pectin in juice and wine. Pectin traps solids and other undesirable compounds in suspension and prevents settling. Pectin will also prevent fining agents from settling.

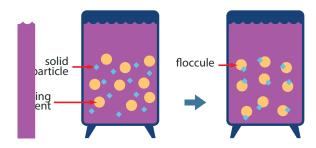
It is difficult to know if a wine has a problematic level of pectin without testing, and bench top trials can be unreliable. Typically, pectin problems are discovered when a fining agent won't settle out. At this point, it may be too late to use enzymes as some fining agents like bentonite can deactivate enzymes. **Proactive use of enzymes is an inexpensive fix to avoid this issue. Enzyme use during clarification will also make future filtration easier.**



ADD FINING AGENT(S)

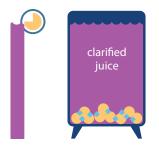
Fining agents bind with solids and other undesirable compounds, forming larger molecules called **floccules**, which fall out of solution more quickly than unbound solids. To determine the most appropriate fining agent and dosage, bench trials should be conducted.

When adding a fining or stability agent it is important to properly rehydrate the product, as well as adequately disperse it into the wine. Closed circulation after addition is recommended at any winemaking stage.



ALLOW TIME TO SETTLE

The floccules created by the fining agent will settle to the bottom of the tank over time. Temperature is the main driver of settling rate, and cold temperatures (close to freezing) can inhibit settling and will also inhibit most enzyme activity.



ARTICLE

FERMENTING ON BENTONITE

Bentonite can be added to the fermentation vessel of any varietal but is particularly beneficial for tank fermented whites and rosés that need protein stabilization. More specifically, high-protein cultivars like Sauvignon blanc and Gewürztraminer, and other early-to-bottle white and rosé wines benefit most from this practice. Early protein stabilization allows for the preservation of aromatics, minimizes racking steps, and saves time when compared to post-fermentation bentonite additions.

Bentonite can be used at any stage of the winemaking process, though different types of bentonite should be used depending on the winemaking stage and winemaking goals. **FERMOBENT® PORETEC** is our recommended bentonite for use during fermentation because of its exceptional purity, good dispersion, effective protein removal, and formation of a compact deposit.



WHY FERMENT ON BENTONITE?

BENEFITS INCLUDE:

- Early removal of heat unstable proteins (solubility of proteins decrease as alcohol increases)
- May eliminate some post-fermentation processes
- Better preservation of aromatics than post-fermentation additions*
- May stimulate fermentation by increasing surface area for the yeast
- FERMOBENT PORE-TEC compacts well and leads to lower lees volumes than post-fermentation bentonite treatments

COMMON CONCERNS

DOES FERMENTING ON BENTONITE AFFECT YAN?

Trials at Erbslöh suggest fermenting on bentonite does not diminish yeast assimilable nitrogen (YAN). This is even less of a concern if a proper nutrition strategy is followed (see pg 63 for recommendations).

*ARE AROMATICS AFFECTED NEGATIVELY?

No, in most cases aromatics are higher in wines fermented on bentonite when compared to those receiving post-fermentation bentonite treatments (Horvat et al., 2019). Though the reasons for this preservation are not completely understood, it is hypothesized that this is due to bentonite's inhibition of aroma-degrading enzymes.

CAN ANY BENTONITE BE USED?

No, standard bentonite is not pure enough. Heat and vigor during fermentation can lead to leaching of copper and iron from unpure bentonite which could result in green and brown color taints. It is important to use a consistently clean bentonite, like FERMOBENT PORE-TEC.

HOW TO FERMENT ON BENTONITE

HOW MUCH BENTONITE SHOULD BE USED?

It is always best to determine dose rate by bench trials either with heat & turbidity testing or protein juice analysis with an accredited lab like **ETS Laboratories**. However, if bench trials are not performed, follow the dosing guidelines on the FERMO-BENT PORE-TEC product information sheet:

Juice with moderate protein content	500-1500 ppm	50-150 g/hL	4.2-12.5 lb/1000 gal
Juice with high protein content and pH values	2000-3000 ppm	200-300 g/hL	16.7-25lb/1000 gal

AT WHAT STAGE OF FERMENTATION SHOULD BENTONITE BE ADDED?

Bentonite may be added at any stage of fermentation; however, studies suggest that adding bentonite mid-to-late fermentation removes proteins more effectively than adding in the juice phase or early fermentation (Horvat et al., 2019). While the reason for this is unclear, it may be because:

- Earlier additions of bentonite may remove proteins that are less prone to haze formation, wasting the bentonite's adsorptive properties.
- Ethanol may open up the bentonite plates, increasing surface area, available binding sites, and potential for adsorption (Horvat et al., 2019).

Citations

Horvat, I., Radeka, S., Plavša, T., & Lukić, I. (2019). Bentonite fining during fermentation reduces the dosage required and exhibits significant side-effects on phenols, free and bound aromas, and sensory quality of white wine. Food Chemistry, 285, 305-315. https://doi.org/10.1016/j.foodchem.2019.01.172

Erbslöh. (n.d.). Always a clear advantage: bentonite for effective clarification and stabilization. Geisenheim, Germany; Erbslöh.

TIMING OF FERMOBENT ADDITION: A CASE STUDY

During harvest 2021, Scott Laboratories collaborated with a Sonoma County winery to investigate how the timing of FERMOBENT® PORE-TEC addition during fermentation affected heat (protein) stability. The trial was inspired by and modeled after a 2019 study published in Food Chemistry which found adding bentonite mid-to-late fermentation removes protein more effectively than adding it in the juice phase or early fermentation (Horvat et al., 2019). The trial was conducted on a lot of Sauvignon blanc that typically requires large post-fermentation bentonite additions to achieve heat stability.

TRIAL SETUP:

Four treatments were performed: the control was fermented without bentonite and the other treatments received a FERMOBENT addition at either the beginning, middle, or end of fermentation. All bentonite additions were made at a rate of 12 lb/1000 gal*. Heat stability trials were conducted at the winery immediately following fermentation.

^{*}The bentonite dose was chosen based on this lot's average post-fermentation bentonite requirements over previous vintages.

			,	analysis condu of fermentatio	ucted at the end on
Treatment (FERMOBENT addition time)	Starting Brix	Brix when bentonite Added	Turbidity be- fore heating (NTU)	Turbidity after heat- ing (NTU)	Difference in NTUs
Control	22.5	No Add	1.1	41.6	40.5
Beginning	22.5	22.4	0.8	5.2	4.4
Middle	22.5	15	0.7	1.4	0.7
End	23.5	6.3	0.6	7.6	7

RESULTS:

The wine that received the FERMOBENT dose in the middle of fermentation was heat stable** following fermentation. This wine required no further bentonite treatments. The control, the "beginning," and the "end" treatments were not heat stable after completing fermentation.

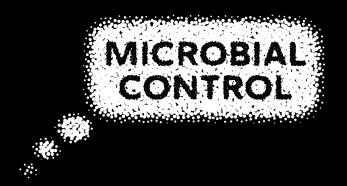
** The definition of "heat stability" does not have an industry-standard consensus. Scott Laboratories and the Institut Oenologique de Champagne (IOC) define heat stability as a <1.5 NTU difference between room temperature turbidity and post-heat treatment turbidity.

WHAT WE LEARNED:

We learned that adding FERMOBENT at any time during fermentation produces a more protein stable wine than if FERMOBENT is not added. Additionally, in this trial, adding FERMOBENT mid-fermentation yielded a protein stable wine immediately following fermentation.



To learn more, scan here to read our article "Bentonite 101: Clarification and Heat/Protein Stabilization" scottlab.com/bentonite-101



Scott Laboratories loves microbial diversity... but not when it interferes with the taste and quality of wine. If your wine is stinky, smells like vinegar, or is re-fermenting without your permission, we're here to help. With our decades of experience, we can help you protect your wine from grape to bottle.



An important part of making wine is controlling microbes during pre-fermentation, fermentation, aging and packaging.

Practices such as adding yeast and ML bacteria, 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 AGENTS WORK IN ONE OF THREE WAYS:

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 lysozyme at non-lethal concentration.
DESTRUCTION	Microorganisms are killed and will not survive to replicate. Destruction strategies include NO BRETT INSIDE™ or BACTILESS™ additions, use of lysozyme (especially at pH >4.0) and the addition of alcohol (as in the case of fortified wines).

MICROBIAL CONTROL AGENTS CAN ADDRESS:

INCREASING VOLATILE ACIDITY	VA can be increased by stressed wine yeast or by 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. Increasing VA can be prevented and addressed with SO ₂ , some non-Sacc yeast strains (see pgs 44-45), lysozyme, or BACTILESS.
PROBLEMS ASSOCIATED WITH HIGH PH WINEMAKING	The higher the pH, the more diverse the microbial population. Additionally, the antimicrobial activity of SO_2 is less effective at higher pHs and other microbial control strategies may need to be used. Careful attention to wine microbiology and chemistry is advised.
ACETIC ACID BACTERIA (AAB)	AAB are generally problematic in the pre- and post-fermentation phases. They can oxidize ethanol to acetic acid (VA), produce polysaccharides that can cause clarification and filtration issues, and cause changes in aromas and flavors. Control growth via BACTILESS TM 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. Control growth with BACTILESS $^{\text{\tiny{TM}}}$, lysozyme or SO $_2$.
UNWANTED YEAST ACTIVITY	Yeast are a highly diverse group of organisms that can be beneficial or detrimental depending on the stage of winemaking. Control growth post–fermentation with ${\rm SO}_2$. Control growth of Bretta-nomyces with NO BRETT INSIDE.

QUICK GUIDE TO CHOOSING MICROBIAL CONTROL AGENTS

	,		
WINEMAKING STAGE	WINE TYPE	WINEMAKING GOAL	RECOMMENDED PRODUCTS
Transportation, incom-	White, Rosé	Prevent VA from indigenous yeast and/or bacteria	LEVEL 2 INITIA™ (see pg 45), SO ₂ *
ing fruit, and in press	Red	Prevent VA from indigenous yeast and/or bacteria	GAIA™ (see pg 44), SO ₂ *
luine or Must	White, Rosé	Prevent VA from indigenous yeast and/or bacteria	BACTILESS™, LEVEL 2 INITIA™ (see pg 45), LYSOZYME, SO ₂ *
Juice or Must	Red	Prevent VA from indigenous yeast and/or bacteria	BACTILESS™, GAIA™ (see pg 44), LYSOZYME, SO ₂ *
	Red, White, Rosé	Prevent VA from indigenous yeast and/or bacteria	INOCULATE WITH YEAST (see pgs 20-36)
		Protect from lactic acid bacteria during sluggish/stuck fermentation	LYSOZYME, SO ₂ *
Fermentation		Delay MLF	LYSOZYME, SO ₂ *
		Inhibit MLF	BACTILESS™, LYSOZYME, SO ₂ *
		Control Brettanomyces	Inoculate ML bacteria with yeast (co-inoculation) or add ML bacteria as soon as alcholic fermentation is complete (see ML section pgs 69-74)
	Red, White, Rosé	Control lactic acid bacteria	BACTILESS™, LYSOZYME, SO ₂ *
Aging		Control acetic acid bacteria	BACTILESS™, SO ₂ *
		Control Brettanomyces	NO BRETT INSIDE™, SO ₂ *
Pre-Bottling	Red, White,	Control spoilage organisms	SO ₂ *
Bottling Red, White, Rosé		Prevent refermentation & spoilage in the bottle	VELCORIN (for more info, see scottlab.com)

^{*}Scott Laboratories offers multiple forms of SO_2 including INODOSE GRANULES, INODOSE TABLETS, and Potassium Metabisulfite (see product descriptions on the following pages, or visit scottlab.com for more information).

MICROBIAL CONTROLS

DELVOZYME LYSOZYME



Lactic acid bacteria inhibitor

 $\mathsf{DELVOZYME}^{@}$ is used to control or inhibit lactic acid bacteria (LAB) including $\mathsf{Oenococcus}$ oeni, $\mathsf{Pediococcus}$ spp., and $\mathsf{Lactobacillus}$ spp.

- Can be used at any stage of the winemaking process
- Lysozyme degrades the cell walls of lactic acid bacteria (gram-positive bacteria). It is not active against acetic acid bacteria (gram-negative bacteria) or yeast
- Effectiveness depends on the number of cells present
- · Recommended contact time is seven days after which racking is recommended
- Should be removed from white and rosé wines with 5–10 g/hL bentonite, but in red wines it will interact with tannin and settle on its own

Warning: In the case of low color potential grapes such as Pinot noir, caution is needed when adding lysozyme prior to completion of alcoholic fermentation. If spoilage yeasts such as Brettanomyces are suspected, SO₂ addition should not be delayed.

Usage: Rehydrate lysozyme 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 3 years at 18°C (65°F). Once rehydrated, Lysozyme should be used immediately.

5 kg – Item Item #16404*

Lysozyme Applications		L	ysozyme Do	ose	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;	Delay	100-200 ppm	10-20 g/hL	0.38-0.75 g/gal	Add at juice stage or immedi- ately after alcoholic fermen- tation
allow for implantation of selected bacteria; delay MLF to increase efficiency of Phase I micro-oxygenation	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

LYSOZYME FAQS

How long does it take for lysozyme to work?

The rate of activity depends on temperature, pH, bacterial load, bacterial resistance, and the specific wine matrix. To ensure accurate results, wait one week before culturing for microbes. If lysozyme-treated wine samples are plated too quickly after treatment, results may show a false-positive.

Is lysozyme effective against all lactic acid bacteria?

No, some lactic acid bacteria strains show resistance to lysozyme. Bench trials MUST be performed to determine the effectiveness and correct addition rate.

How soon after a lysozyme addition can I bottle?

Wait at least one week, even if you have diligently completed lab trials. Lysozyme may produce lees (especially in reds)

and affect the protein stability in whites and rosés. 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 bind to anthocyanins. This tannin loss can result in reduced color. However, using 100–200 ppm should not cause a visually observed decrease in color. Any decrease in color should occur in the first few days of treatment.

For low color potential grapes (e.g. Pinot noir), caution is advised when adding lysozyme prior to the completion of alcoholic fermentation. Bench trials are critical.

FRUIT & MEAD

BACTILESS



Acetic acid and lactic acid bacteria control

BACTILESS™ is an allergen-free, innovative microbial control agent used to protect wine from acetic and lactic acid spoilage bacteria.

• Uses include:

- NEW USE Use in the juice or must phase to control spoilage bacteria without negatively impacting alcoholic or malolactic fermentation (MLF)
- Use post alcoholic fermentation to control spoilage bacteria populations if MLF is not desired
- Use post malolactic fermentation to reduce bacteria populations, including malolactic bacteria
- · When used in juice or must, rack before initiating malolactic fermentation. When added to wine, rack after 10 days contact time
- · Offers an interesting alternative to lysozyme treatment and/or significant amounts of SO, but does not replace the use of SO₂ as it does not have antioxidant or antifungal properties
- · BACTILESS is sensory neutral and cannot decrease any sensory contribution already produced by spoilage bacteria
- BACTILESS is a 100% natural, non-allergenic source of chitin-glucan and chitosan from a non-GMO strain of Aspergillus niger
- When BACTILESS is used early in the winemaking process, we recommend initiating MLF with a double dose of LALVIN VP41™

Note: Chitin-glucan for the use of microbial control is listed by the TTB in 27 CFR 24.250 but not on 27 CFR 24.246. For more information, please visit TTB.gov. 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 homogeneous addition. Leave BACTILESS 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 environment below 25°C (77°F).

Recommended D)osage		
200-500 ppm	20-50 g/hL	.67-4.16 lb/1000 gal	45-113 g/60 gallon barrel

500 g - Item #15232*

BACTILESS FAQS

Do I have to rack my wine after 10 days?

Yes.

Can I add BACTILESS™ to the top of the vessel without mixing?

No. A thorough mixing is essential so that the BACTILESS and the bacteria can interact.

Does BACTILESS™ have an impact on yeast?

BACTILESS has no impact on S. cerevisiae. It may 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 BACTILESS matrix, but this is not the best use of the product and it may not be reproducible.

What if I have spoilage bacteria and Brettanomyces present?

You can use both BACTILESS™ and NO BRETT INSIDE™. You may wish to adapt the dosage depending on the dominant

organism and your main concern. If Brettanomyces is the main concern, then trial 4g/hL of NO BRETT INSIDE and 10g/hL BACTILESS. If bacteria control is the main goal, then trial 2g/hL of NO BRETT INSIDE and 20g/hL BACTILESS. Rack after 10 days and check the efficacy 30 days after addition. Follow up with a second treatment if necessary.

Can I induce malolactic fermentation after a BACTI-LESS™ addition?

Initially we recommended not using BACTILESS prior to malolactic fermentation. However, after 10 years of research we have updated our recommendations. See product description for new and updated recommendations.

Does BACTILESS™ impact wine sensory character?

BACTILESS is neutral regarding its sensory impact. It is also imporant to note that it does not have the ability to remove any negative sensory compounds that may have been produced by bacterial contaminants prior to treatment.

NO BRETT INSIDE



Brettanomyces spp. control agent

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.

NO BRETT INSIDE $^{\text{m}}$ is an allergen-free, innovative microbial control agent used to reduce Brettanomyces spp., thereby preserving the aromatic qualities of wines.

- Use in wines post alcoholic fermentation to reduce $\it Brettanomyces$ populations when MLF is either already complete or is not desired
- Should never be used until MLF is complete without consulting Scott Laboratories
- Recommended contact time is 10 days
- Offers an interesting alternative to significant amounts of SO_2 but does not replace the use of SO_2 as it does not have antioxidant or antibacterial properties
- NO BRETT INSIDE cannot decrease any sensory contribution (barnyard, medicinal, smoky) already produced by spoilage *Brettanomyces*
- 100% natural, non-allergenic source of chitosan from a non-GMO strain of Aspergillus niger

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 pumpover or tank/barrel mixings to ensure a homogeneous addition. Leave the NO BRETT INSIDE in contact with the wine for 10 days and then conduct a clean racking. To assess NO BRETT INSIDE 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). *NO BRETT INSIDE should be added post-MLF.

Recommended Dosage			
40-80 ppm	4-8 g/hL	0.33-0.67 lb/1000 gal	9-18 g/60 gallon barrel

100 g - Item #16410*

NO BRETT INSIDE FAQS

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. *Brettanomyces* is associated with the lees. Mixing ensures that NO BRETT INSIDE can trap *Brettanomyces*.

Can I induce malolactic fermentation after a NO BRETT INSIDE™ addition?

This is still to be determined, however, we advise waiting until malolactic fermentation is complete before using NO BRETT INSIDE.

Does NO BRETT INSIDE™ impact the sensory of the wine?

No. It will also not remove any of the sensory compounds that may already be present due to a *Brettanomyces* infection (4-ethylphenol and 4-ethylguaiacol).

What is the difference between BACTILESS™ and NO BRETT INSIDE™?

The source is the same (Aspergillus niger), but the formulations are different. Therefore they control different microbial populations.

What if I have spoilage bacteria and Brettanomyces present?

You can use both BACTILESS™ and NO BRETT INSIDE™. If Brettanomyces is the main concern, trial 4g/hL of NO BRETT INSIDE and 10g/hL BACTILESS. If bacteria are the main concern, trial 2g/hL of NO BRETT INSIDE and 20g/hL BACTILESS. Rack after 10 days and check the efficacy 30 days after addition. Follow up with a second treatment if necessary.

ARTICLE

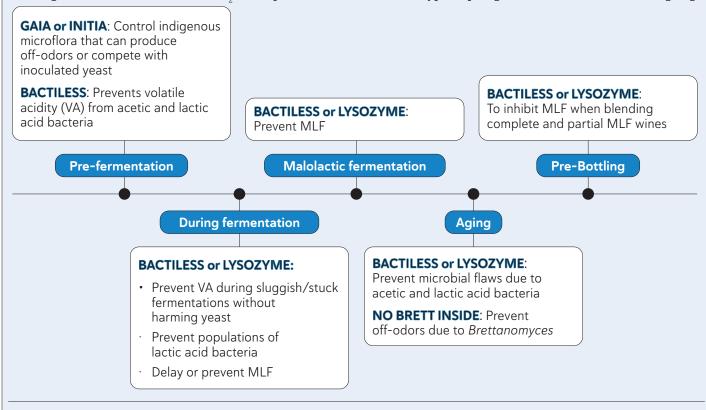
PREVENTING MICROBIAL ISSUES WITHOUT SO,

Sulfur dioxide (SO₂) has been used for millennia to prevent microbial spoilage in food and beverages. However, there are circumstances when SO₂ cannot be used or is not effective. For example:

- · Making organic or low-chemical input wines
- Wine chemistry limits effectiveness of SO₂:
 - Pre-fermentation, the antimicrobial action of SO₂ is limited because it is bound to sugar and other juice or must components.
 - Post-fermentation, the antimicrobial action of SO₂ is limited by higher pH, because pH affects how much SO₂ is in the antimicrobial (molecular) form.
- Packaging wine in aluminum cans SO, must be limited throughout the winemaking process to prevent H,S from developing once canned

WHEN TO USE SO, ALTERNATIVES:

Microbial spoilage occurs when unwanted microbial activity results in off-odors, off-flavors, visual flaws, and/or impedes fermentation. Unwanted microbial activity can occur at many stages of winemaking, leading to many different problems. When choosing antimicrobial alternatives to SO_a, it is important to understand what type of spoilage can occur at each winemaking stage:



HOW SO₂ ALTERNATIVES WORK:

NON-SACCHAROMYCES YEAST

GAIA™ and LEVEL² INITIA™ are non-Saccharomyces yeasts that are effective pre-fermentation antimicrobial agents. They outcompete indigenous organisms that can produce VA and other off-aromas, initiate alcoholic fermentation, and interfere with inoculated yeast. The antimicrobial activity of GAIA and INITIA are more effective than SO₂ pre-fermentation because SO₂ can be bound by sugar and other juice or must components.

Both GAIA and INITIA outcompete indigenous microorganisms via a phenomenon known as microbial crowding. Microbial crowding occurs when a microorganism occupies the entire ecological niche through large population numbers. INITIA will also rapidly consume large amounts of oxygen, which further deprives pre-fermentation spoilage organisms of oxygen they require for growth.

LYSOZYME

Lysozyme is an enzyme derived from egg whites that has been used in the food and beverage industry for decades. Lysozyme is compatible with low chemical input and organic winemaking. Its antimicrobial properties come from its ability to cause cell lysis in gram positive bacteria including lactic acid bacteria.

Prior to the introduction of lysozyme to the wine industry, there was no way to target unwanted bacterial populations without affecting the activity of yeast. Lysozyme therefore opened the door to controlling the production of VA during stuck and sluggish fermentations.

CHITOSAN

Chitosan is an exciting non-allergenic and non-animal-based tool for traditional, vegan, and low chemical input winemaking. NO BRETT INSIDE $^{\text{TM}}$ and BACTILESS $^{\text{TM}}$ are chitosan-based antimicrobial agents that can be used instead of SO $_2$ to control *Brettanomyces* spp., lactic acid bacteria and acetic acid bacteria. Both NO BRETT INSIDE and BACTILESS are more effective than SO $_2$ after fermentation, especially in high pH wines.

Chitosan is derived through the deacetylation of chitin which is naturally produced by many living organisms and is the second most abundant polysaccharide on earth after cellulose. Depending on the preparation, chitosan can vary in degree of deacetylation, thus impacting the molecules' ionic charge, molecular weight, and solubility. By changing one or more of these properties, the functionality of the chitosan molecule changes

The formulations of NO BRETT INSIDE and BACTILESS cause intense electrostatic interactions with negatively charged components on yeast and bacteria cell walls, causing them to attach to the surface of the chitosan and settle out with the product. Additionally, the chitosan can cause cell membrane damage leading to an osmotic and energy imbalance, loss of growth capacity, and eventually cell death.

Note: These products do not completely replace the use of SO_2 - BACTILESS, GAIA, Lysozyme, and NO BRETT INSIDE do not offer antioxidant protection, and INITIA only offers antioxidant protection prior to fermentation.

INODOSE GRANULES

Effervescent sulfur dioxide granules



INODOSE GRANULES are pre-measured into convenient package sizes to make SO_2 additions easier and safer.

- Small, effervescent granules made of potassium metabisulfite and potassium bicarbonate
- Granules start to dissolve upon addition, releasing a precise dose of total SO₂ (free SO₂ will increase based on conditions)
- Perfect for SO₂ additions to incoming must, juice, and wines
- · The effervescent action of the bicarbonate assists with mixing and has little or no effect on pH

100 g - Item #15780*

400 g - Item #15781*

Note: Volume discounts are available. Please contact us for details.

INODOSE TABLETS

Effervescent sulfur dioxide tablets



INODOSE TABLETS are ideal for adjusting SO₂ levels in barrels and small tanks. They are pre-measured into convenient package sizes (2g and 5g) to make SO, additions easier and safer.

- · Blend of potassium metabisulfite and potassium bicarbonate
- Tablets start to dissolve upon addition releasing a precise dose of total SO₂ (free SO₂ will increase based on conditions)
- Pre-determined dose helps eliminate errors in the cellar
- · Sealed strip packages keep unused tablets fresh for optimal efficacy
- · Potassium bicarbonate portion assists with mixing and has little or no effect on pH
- The effervescent action of the bicarbonate assists with mixing in barrels or small tanks while reducing time and labor needed for stirring

2 g (48/box) – Item #15775*

5 g (42/box) - Item #15776*

Note: Volume discounts are available. Please contact us for details.

INODOSE GRANULES & TABLETS INSTRUCTIONS FOR USE

Usage: Various applications include:

- · Add to gondolas or picking bins to inhibit oxidation of grapes and juice
- Add during transport of must or juice to inhibit indigenous yeast and bacteria
- · Add in tanks before or after fermentation to inhibit oxidation and unwanted microbial activity
- · Add directly into barrels after malolactic fermentation to inhibit oxidation and unwanted microbial
- To make SO₂ additions to wine during aging

Storage: 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.

INODOSE GRANULES and TABLETS Conversion Chart (ppm Total SO₂)

SO2 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, products contribute a precise dose of pure SO, when added to the wine, measured as total SO,. These products are blends of potassium metabisulfite and potassium bicarbonate and weigh more than 2 g, 5 g, etc.

POTASSIUM METABISULFITE

Potassium metabisulfite can be used throughout the winemaking process from grape receipt to finished wine.

1 kg - Item #POTMETA1K*

TARTARIC ACID



Used to correct tartaric acid deficiencies, to decrease the pH, and/or increase the titratable acidity of grapes, juice, and wine thereby enhancing microbial stability, wine color, and flavor.

5 kg - Item #TARTARIC5*

CHECK OUT OUR BEST PRACTICES GUIDES

We created these Scott Labs best practices guides to provide both process and product recommendations for helping winemakers work with compromised fruit and difficult winemaking conditions.



Best Practices for Working with Rot scottlab.com/rot



Best Practices for Working with Smoke Exposed Grapes scottlab.com/smoke



Best Practices for Working with Underripe Grapes scottlab.com/underripe



Best Practices for Juice Clarification Via Settling scottlab.com/settling

FRUIT WINES & MEAD

Yeast	Fruit	Mead	Pg#
LALVIN 71B™	•		20
CVW5™	٨	•	25
LALVIN DV10™	٨	•	25
LALVIN EC1118™	٥	•	26
LALVIN ICV D47™	۵		28
K1 (V1116)™	٥	•	30
LALVIN ICV OKAY™	٨		29
LALVIN QA23™	٨	•	32
LALVIN R2™	٨		32
LALVIN SENSY™	٨		34
VIN 13	٥	•	35
Nutrients			
GO-FERM PROTECT EVOLUTION™	٥	•	55
GO-FERM STEROL FLASH™	۵	•	54
FERMAID K™	٥	•	59
FERMAID O™	٥	•	56
Malolactic Bacteria			
LALVIN (MBR) 31™	٨		71
O-MEGA™	٨		72
SOLO SELECT™	٨		73
Enzymes			
LALLZYME MMX™	٥		103
SCOTTZYME® HC	٨		105
SCOTTZYME® KS	٨		106
SCOTTZYME® SPECTRUM	٨		107
SCOTTZYME® PEC5L	٨		106

Tannins	Fruit	Mead	Pg#
SCOTT'TAN™ FT BLANC	•		91
SCOTT'TAN™FT BLANC CITRUS	•	۵	91
SCOTT'TAN™FT BLANC SOFT	•	٨	92
SCOTT'TAN™FT COLORMAX	•		92
SCOTT'TAN™FT ROUGE	•		93
SCOTT'TAN™FT ROUGE BERRY	•		93
SCOTT'TAN™FT ROUGE SOFT	•		94
SCOTT'TAN™ RADIANCE	•		94

Fining/Stability Agents		
BENTOLACT S	•	116
CASÉINATE DE POTASSIUM	•	116
COLLE PERLE	•	119
CRISTALLINE PLUS	•	♦ 121
FRESHPROTECT	•	b 116
FERMOBENT	•	115
FLASHGUM R LIQUIDE	•	♦ 122
GELOCOLLE	•	♦ 120
INOCOLLE	•	120
NACALIT	•	115
NO[OX]	•	6 118
POLYCACEL/POLYCEL	•	117
OI'LIP XC		118

Yeast Derivative Nutrients						
GLUTASTAR™	•	٥	60			
ICV NOBLESSE™	•	٥	61			
OPTI-MUM RED™	•		61			
OPTI-RED™	•		61			
OPTI-WHITE™	•	٥	62			
REDULESS™	•	٨	62			

Making wine from sources other than grapes requires different winemaking decisions. However, many tools used in grape fermentations can also be used in fruit or mead fermentations. These tools can help create a better product and ultimately enhance product longevity.

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 H₂S 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. NO-BLESSE™ 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. REDULESS™ is used to treat wines suffering from sulfur off-odors (e.g. H₀S).

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 color. ESSENTIAL ANTIOXIDANT protects against oxidation and SCOTT TAN™ 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 SCOTT'TAN $^{\text{TM}}$ FT COLORMAX, which is most effective when used in conjunction with SCOTT'TAN $^{\text{TM}}$ FT ROUGE or FT ROUGE SOFT. SCOTT'TAN $^{\text{TM}}$ RADIANCE is an ideal tannin 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 SCOTTZYME® PEC 5L and HC will work for most situations. For certain difficult situations, such as fruit compromised by rot, stronger enzymes like SCOTTZYME® KS or LALLZYME MMX™ may be necessary. Both of these should only be used on juice or wine according to directions. Some enzymes, such as RAPIDASE® 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 form a more compact sediment. GI'UP XC is 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. NO[OX] (chitosan), CASÉINATE DE POTASSIUM (casein) and POLYCEL (PVPP) are effective at removing the bitterness and browning caused by oxidation of young wines. For fruit wines subject to protein instability, bentonite fining is the only way to remove the unstable proteins.

MICROBIAL CONTROL

Sulfur dioxide (SO_2), Lysozyme, BACTILESSTM and NO BRETT INSIDETM 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. Lysozyme attacks gram-positive bacteria, such as Lactobacillus spp., Pediococcus spp. and Oenococcus oeni. BACTILESSTM kills a wider range of bacteria, from lactic acid bacteria to acetic acid bacteria. Both BACTILESSTM and Lysozyme can be used to delay or inhibit malolactic fermentation.

GENERAL TOOLS & 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

ONLINE UNIT CONVERSION RESOURCES

TEMPERATURE CONVERSIONS

F°	0	32	40	50	60	70	80	90	100	110	120	$C^{\circ} \rightarrow F^{\circ} = (C^{\circ} \times 9/5) + 32$
C°	-18	0	4	10	16	21	27	32	38	44	49	$F^{\circ} \rightarrow C^{\circ} = (F^{\circ} - 32) \times (5/9)$

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)

HOW TO ORDER

We're here to make your life easy! You can order from Scott Laboratories in a variety of convenient ways:

PLANNING YOUR ORDER

PDF ORDER PLANNER: To make planning your orders easy, fill out the pdf form at **scottlab.com/order-planner** before ordering online or by phone.

ORDER ONLINE AT 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.

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 recreate, 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 reordering, 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.

ORDER BY PHONE AT 707-765-6666

^{*}Standard barrel size is 60 gallons. 59 and 70 gallon barrels are also common and sometimes the three are not visually distinct in size.

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