SCOTT LABORATORIES

2022 WINEMAKING HANDBOOK

PREMIUM PRODUCTS FOR WINEMAKING

WELCOME

You Have a Friend at Scott Labs

Welcome to the 2022 edition of the Scott Labs' Winemaking Handbook! Our 27th edition continues to bring you best-in-class winemaking products supported by our expert know-how.

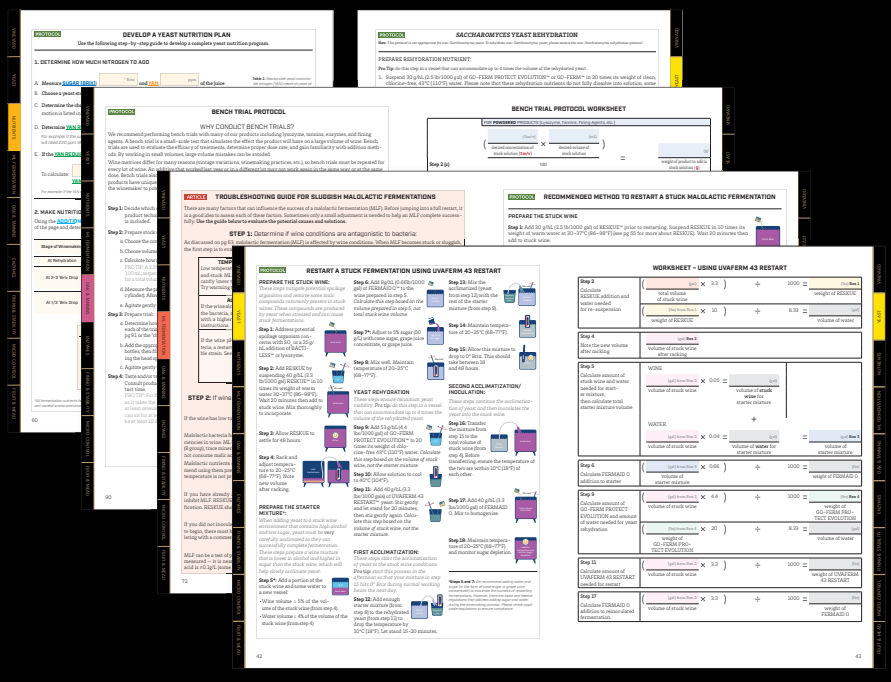
Scott Laboratories loves winemaking tools that harness the power of microorganisms! From yeast that scavenge oxygen to chitosan used for fining, we're excited about our growing portfolio of products that are compatible with organic, vegan, non-allergen, and clean label winemaking. See pg 7 for our OMRI listed products, and pgs 58-59 for an excellent article on oxidative damage prevention while limiting the use of sulfur dioxide.

We also love helping winemakers. This year, we've developed some practical tools that we hope will make life easier. We've developed calculation and planning worksheets for: yeast rehydration (pg 41), nutrient additions (pg 60), restarting alcoholic (pgs 42-43) and malolactic (pg 73) fermentations, and bench trials. We've also improved the choosing guides for nutrients (pgs 48-49) and fining and stability products (pgs 106-107).

As always, we look forward to seeing you in person or by video chat, talking with you by phone, or answering your emails or web requests. We can't wait to hear your feedback!

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

Jessica Just *Fermentation & Enology Dept. GM*



SUPPLIERS

LALLEMAND

lallemandwine.com

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

The Lallemand/Scott Laboratories relationship, now in its 47th year, has brought North American winemakers nearly one hundred Lallemand products including yeast, yeast-based products, bacteria and enzymes. These products have changed the way North America makes wine and have changed winemakers' understanding of winemaking.

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

IOC

ioc.eu.com

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

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

ANCHOR

anchoroenology.com

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

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

THE OAK LAB

theoaklab.com

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

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

OENOBRANDS

oenobrands.com

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

ERBSLÖH

erbsloeh.com

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

AIRD INNOVATIONS IN CHEMISTRY

airdchemistry.com

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

CONTENTS

Vendor Notice: *The information in this booklet 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 qualities 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.*

NEW PRODUCTS FROM SCOTT LABORATORIES

LALLEMAND

NON-*SACCHAROMYCES* YEAST

INITIA™

Oxygen-scavenging yeast to protect aroma and color and preserve juice quality

LEVEL2™

INITIA™ is a pure culture of *Metschnikowia pulcherrima* that offers **antioxidant** and **antimicrobial protection** by quickly consuming oxygen. When added to freshly pressed white or rosé juice INITIA can **prevent browning and other damaging oxidative effects**, producing wines with fresher aromatics and brighter color. INITIA also acts as an antimicrobial agent, **suppressing spoilage organisms** like indigenous yeast and acetic acid bacteria. INITIA consumes oxygen faster than SO_2, making INITIA ideal for **low chemical input winemaking**.

IOC

TANNIN

ESSENTIAL ANTIOXIDANT

Tannin for antioxidant 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.

ERBSLÖH
Progress is our future

FINING AID

FermoBent® PORE-TEC

Bentonite for use during fermentation for early removal of heat-unstable proteins

FERMOBENT® PORE-TEC is a granular sodium-calcium based **bentonite specifically formulated for use during fermentation**. Fermenting on bentonite may **eliminate or reduce the need for protein stabilization before bottling** and can **limit wine loss**.

Many bentonites are not pure enough for use during fermentation as heat and vigor can lead to leaching of copper and iron from unpure bentonite which could result in green and brown color taints. FERMOBENT PORE-TEC, however, boasts a very low iron content high level of purity.

LALLEMAND OMRI listed

YEAST DERIVATIVE NUTRIENT

GLUTASTAR™

Yeast derivative nutrient for protection against oxidative damage and increased wine shelf-life

GLUTASTAR™ is an OMRI-listed yeast derivative nutrient that **protects and stabilizes juice and wine aroma and color** due to its unique antioxidant peptides and high concentration of GSH (reduced glutathione). GLUTASTAR'S high GSH content allows it to scavenge free radicals, lowering the oxidation potential of the wine and **increasing shelf-life**. GLUTASTAR also **increases the perception of freshness and enhances mouthfeel**.

NEW PRODUCTS FROM SCOTT LABORATORIES

IOC

FINING AID

No[Ox]

Animal-free, non-allergenic removal of oxidized characters in juice and wine

NO[OX] is an innovative, highly specialized chitosan-based fining aid to **treat oxidation-induced browning and off-aromas**. This **animal-free, non-allergenic** fining aid **is more effective than casein and casein alternatives** at treating oxidative effects on color and aroma. Treating juice and wine with NO[OX] removes brown color, increases fruity and floral notes, decreases herbaceous and bitter notes, and contributes to increased overall wine balance.

IOC

FINING AID

Qi'UP XC

Animal-free, non-allergenic clarification fining aid

Qi'UP XC is used in juice and wine for **superior clarification**. This innovative floccing agent is **used during juice flotation and traditional cold settling** and is an **animal-free, non-allergenic alternative to gelatin**. Qi'UP XC is a specialized preparation of chitosan that has a high surface charge allowing it to bind to solid particles resulting in excellent clarification.

OMRI® Listed

OMRI® LISTED PRODUCTS

NEW GLUTASTAR™

NEW LalVigne™ Grow your wine

GO- FERM PROTECT EVOLUTION

GO-FERM

FERMAID O

NOBLESSE

NUTRIENT VIT-END

OPTI-MUM RED

OPTI-RED

OPTI-WHITE

REDULESS

ML RED BOOST

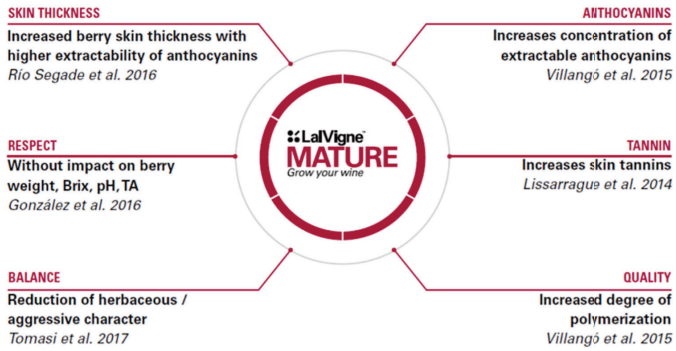
OPTI'MALO BLANC

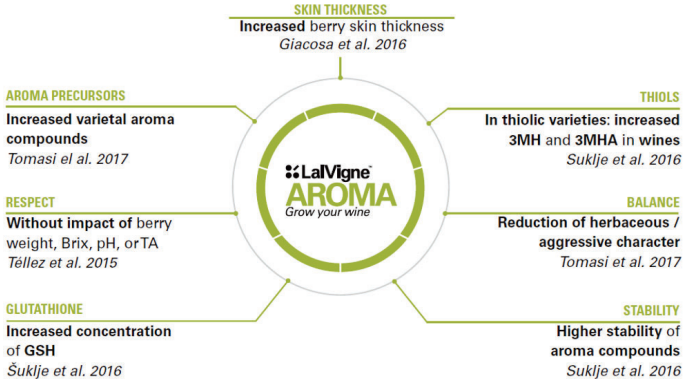
VINEYARD PRODUCTS

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.

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.





SELECTING LALVIGNE FOR SUCCESS

Each vineyard will differ in its potential to provide quality grapes and yield depending on many factors. For optimum wine quality vineyard practices and products are tailored to the vineyard location, the stage of growth of the vines, the vintage conditions, and the grape variety.

VINEYARD LOCATION

Vineyard sites are all unique, with different soil types, climates, disease pressure, and surrounding flora and fauna. A challenge with cool sites is that aromas and flavors sometimes have not fully developed when weather finally forces the harvest. A challenge with hot sites is that Brix levels can be well ahead of phenolic ripeness, resulting in long hang times. Management practices are adapted to the challenges and potential of each unique vineyard location.

VINE GROWTH PHASE

During the annual growth cycle, environmental stresses can influence shoot growth, yield, and fruit quality. Vineyard practices and product applications during the key growth stages can have a positive influence on the desired grape and wine quality outcomes.

VINTAGE CONDITIONS

A vintage is characterized by weather conditions, predominately precipitation and temperature. Weather events such as Spring frost, rainfall, hail, and heat spikes can negatively impact vine growth, fruit set and ripening. Wine growers must constantly adapt new strategies to each season's conditions to produce the best wine grapes possible in the vintage.

GRAPE VARIETY

Each grape variety has benefits and challenges. The goal is to bring out the positive phenolic and aromatic potential unique to each variety in the vineyard. Vineyard management practices and products are used to enhance the varietal characteristics of the grapes and resulting wines.

LALVIGNE® AROMA
LALVIGNE LA

Yeast-based foliar spray for enhancing varietal expression

White grape varieties

LALVIGNE®AROMA can improve both grape and wine quality by increasing varietal compounds and improving mouthfeel in challenging conditions. LALVIGNE®AROMA increases the concentration of glutathione which helps protect aromatic compounds from degrading and makes them more stable for aging. In thiolic varieties, LALVIGNE®AROMA increases 3MH aromatic precursors which convert to 3MHA. This results in an increased concentration of thiol aromatic compounds and a reduction of negative green characteristics in varieties such as Sauvignon blanc. There is minimal impact on berry weight, Brix, pH or TA.

Recommended Dosage
1 treatment = 2 applications = $94/acre
1 application = 2.7 lb/acre/1.2 kgs/acre

$120.80 – 3 kg LALVIGNE AROMA* – #17501
$120.80 – 3 kg LALVIGNE LA** – #17500

LAVIGNE® MATURE
LALVIGNE LM

Yeast-based foliar spray for phenolic maturity and uniform ripening

Red grape varieties

LALVIGNE®MATURE advances phenolic maturity and homogenizes the ripening process 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 also increases skin thickness which allows for better extractability of anthocyanin as well as improved skin tannin texture and polymerization. There is minimal impact on berry weight, Brix, pH or TA.

Recommended Dosage
1 treatment = 2 applications = $94/acre
1 application = 0.9 lb/acre/405 g per acre

$121.40 – 1 kg LALVIGNE MATURE* – #17511
$121.40 – 1 kg LALVIGNE LM** – #17510

HOW IT WORKS

Many physiological changes occur rapidly 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 the levers and throttles of the 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 aromatic and phenolic precursor pathways. This increases the flow of aromatic and phenolic compounds into the berries while decreasing pyrazines.

2. Second Application: 7-14 days following the first application (10-12 days is ideal). At this point, LALVIGNE® continues the flow of aromatic and phenolic compounds to the ripening berries.

3. Harvest on Your Schedule: LALVIGNE® application results in an earlier and larger harvest window due to advances in aromatic and phenolic maturity. 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*

The following states have no registered use: ID, ND, OK, SD, WV

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).

PRODUCT PREVIEW

LalVigne™ PROHYDRO
Grow your wine

COMING 2023

LALVIGNE PROHYDRO

to increase vine tolerance to water stress

Scott Laboratories is excited to introduce LALVIGNE PROHYDRO to the U.S. in 2023! PROHYDRO naturally increases the 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
Grow your wine

LalVigne™ AROMA
Grow your wine

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.**

YEAST

Scott Laboratories: Celebrating 89 Years of Commercial Yeast Production

Scott Laboratories loves yeast! We were founded as a yeast company in 1933 and were instrumental in bringing active dried yeast to the wine industry in North America. In 1974, we partnered with Lallemand to produce our yeasts and that partnership continues today. After nearly a century of yeast research & development, Scott Laboratories and Lallemand know yeast better than any other yeast producer and are uniquely positioned to assist winemakers in matching strains to their goals and challenges.

Yeast convert sugar to alcohol, but they can do so much more! At Scott Laboratories, our mission is to provide 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/must is particularly YAN deficient, choose a yeast strain with low nitrogen needs.

STEP 2: Compare the sensory impact of compatible yeast strains

SENSORY IMPACT

Yeast contribute to wine aroma, flavor, and mouthfeel. They can release aromas from grapes as well as produce aromatic compounds themselves. 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_2S) 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**  **in the yeast descriptions to identify these strains.**

SELECTING A YEAST STRAIN

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 20-35 for detailed descriptions of each yeast.

See pg 61 for advice on selecting yeast specifically for rosé production.

YEAST STRAINS FOR WHITE & ROSÉ WINE

○ Yeast Strain Type
♦ Recommended
M Mouthfeel
Evc Enhanced Varietal Character
E Esters
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	43/43 RESTART	58W3	71B	ALCHEMY I	ALCHEMY II	ASSMANSHAUSEN (AMH)	BA11	BM 4X4	BRG	CEG (EPERNAY II)	CROSS EVOLUTION	CVW5	CY3079	DV10	EC1118	ELIXIR	EXOTICS MOSAIC	EXOTICS NOVELLO	FERMIVIN CHAMPION	FERMIVIN SM102	ICV D21
Pg#	20	20	20	21	21	22	22	23	23	23	24	25	25	25	25	26	26	26	26	27	27
S. cerevisiae cerevisiae		○	○			○	○		○	○			○							○	○
S. cerevisiae bayanus	○											○		○	○				○		
Yeast hybrid											○					○	○	○			
Yeast blend				○	○			○													
Alcohol Tolerance[1]	17%	14%	14%	15.5%	15.5%	15%	16%	16%	15%	13.5%	15%	15%	15%	17%	18%	15%	15.5%	15.5%	18%	12%	16%
YAN Requirements[2]	Low	Med	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	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	Fast	Fast	Slow	Mod	Mod	Fast	Slow	Mod	Fast	Mod	Fast	Fast	Slow	Mod	Mod	Mod	Slow	Mod
Competitive Factor	Yes	Ntrl	Snstv	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	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, E	Evc	Evc	E, M	Evc, M	Evc, M	E	Evc, M	E	Evc, M	Ntrl	Ntrl	Evc, E	Evc, M	Evc, M, E	Ntrl	E	Evc, M
Fruity (Esters)		♦	♦			♦	♦			♦		♦	♦			♦	♦	♦		♦	♦
Green (Thiols)					♦																
Tropical (Thiols)				♦	♦		♦				♦					♦	♦	♦			
Citrus (Esters And Thiols)				♦	♦											♦		♦			
Floral		♦					♦				♦		♦			♦		♦		♦	
Nutty													♦								
Mineral/Freshness									♦					♦							♦
Spicy		♦				♦	♦														
Mouthfeel		♦					♦	♦	♦		♦		♦				♦				♦
Aromatic Whites		♦	♦	♦	♦	♦	♦				♦	♦				♦	♦	♦			♦
Chardonnay				♦				♦	♦		♦	♦	♦	♦				♦			♦
Sauvignon blanc				♦	♦						♦			♦		♦		♦		♦	
Rhône Style Whites		♦		♦			♦				♦		♦	♦		♦	♦				♦
Rosé			♦							♦		♦				♦	♦				♦
Suitable For Barrel Fermentation								♦					♦				♦				♦
No-Low H_2S, SO_2 Production Strains																					
Suitable For Restarting A Stuck Fermentation	♦																		♦		

1. 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 60.*

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

YEAST STRAINS FOR WHITE & ROSÉ WINE

○ 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	NT 116	QA23	R2	RHÔNE 4600	R-HST	SAUVY	SENSY	VIN 13	VIN 2000	W15
Pg#	27	28	28	28	29	29	29	29	30	30	31	32	32	33	33	33	34	35	35	35
S. cerevisiae cerevisiae	○	○	○			○			○					○	○	○				○
S. cerevisiae bayanus										○		○	○							
Yeast hybrid				○	○		○	○			○						○	○	○	
Yeast blend																				
Alcohol Tolerance[1]	15%	16%	15%	16%	14%	16%	14%	15%	18%	14.5%	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	Low	High	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	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	Fast	Fast	Mod	Mod	Mod	Mod	Mod	Fast	Mod	Mod
Competitive Factor	Yes	Ntrl	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	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	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, E	Evc	Evc	E	Evc, M	Evc	Evc, M	Evc, E	Evc, E	Evc, M
Fruity (Esters)	♦		♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦			♦	♦		♦
Green (Thiols)																♦				
Tropical (Thiols)								♦		♦	♦	♦		♦				♦	♦	
Citrus (Esters And Thiols)	♦				♦			♦		♦	♦	♦			♦			♦	♦	
Floral	♦								♦			♦	♦		♦			♦		
Nutty		♦																		
Mineral/Freshness																				
Spicy												♦								
Mouthfeel	♦	♦	♦		♦					♦					♦		♦			♦
Aromatic Whites	♦			♦	♦		♦				♦	♦	♦	♦	♦		♦	♦		♦
Chardonnay	♦	♦			♦							♦					♦		♦	
Sauvignon blanc					♦			♦		♦		♦	♦		♦	♦		♦		
Rhône Style Whites	♦	♦	♦	♦	♦									♦	♦					
Rosé	♦		♦		♦	♦	♦	♦						♦			♦			♦
Suitable For Barrel Fermentation	♦	♦																	♦	
No-Low H_2S, SO_2 Production Strains				♦	♦		♦	♦									♦			
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.

Red Wine Yeast Strains continue on next page

YEAST STRAINS FOR RED WINE

○ Yeast Strain Type
● Recommended
M Mouthfeel
Evc Enhanced Varietal Character
E Esters
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	43	43 RESTART	71B	3001	ALCHEMY III	ALCHEMY IV	ASSMANSHAUSEN (AMH)	BDX	BM 4X4	BRG	BRL97	CLOS	CSM	CVRP	EXOTICS MOSAIC	EXOTICS NOVELLO	FERMIVIN CHAMPION	FERMIVIN MT48
Pg#	20	20	20	21	21	22	22	22	23	23	23	24	24	24	26	26	26	27
S. cerevisiae cerevisiae			○	○			○	○		○	○	○	○	○				○
S. cerevisiae bayanus	○	○															○	
Yeast hybrid															○	○		
Yeast blend					○	○			○									
Alcohol Tolerance[1]	17%	17%	14%	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	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	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	Fast	Fast	Slow	Mod	Mod	Fast	Mod	Fast	Mod	Mod	Mod	Mod	Mod	Mod
Competitive Factor	Yes	Yes	Snstv	Yes	Yes	Yes	Snstv	Snstv	Yes	Ntrl	Yes	Yes	Yes	Yes	Yes	Yes	Ntrl	Ntrl
MLF Compatibility	Very Good	Very Good	Very Good	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	E	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															●			
Floral					●				●						●			●
Freshness										●								
Fruit-Black												●	●	●		●		●
Fruit-Red	●		●	●	●	●	●		●		●	●	●	●	●	●		●
Fruit-Jammy								●	●		●	●		●				
Savory				●			●		●									
Spicy							●	●	●	●			●			●		●
Mouthfeel Impact (Roundness And/Or Structured)				●		●		●	●	●		●		●	●	●		●
Minimizes Herbaceousness					●	●		●					●	●		●		
No-Low H_2S, SO_2 Production Strains																		
Cabernet Sauvignon					●			●	●			●	●	●				
Merlot								●										
Pinot noir			●	●		●	●			●	●							
Light-Bodied Reds			●	●		●	●			●	●		●		●			●
Medium-Bodied Reds					●	●	●	●	●		●		●			●		●
Full-Bodied Reds	●				●			●	●			●		●				
Suitable For Restarting A Stuck Fermentation		●															●	

1. 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 60.*

YEAST STRAINS FOR RED WINE

○ Yeast Strain Type
♦ Recommended
M Mouthfeel
Evc Enhanced Varietal Character
E Esters
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	ICV D21	ICV D80	ICV D254	ICV GRE	ICV OKAY	IONYS$_{WF}$	MT	NT 116	NT 202	PERSY	RC212	RHÔNE 2226	RP15	SYRAH	T73	TANGO	VRB	W15
Pg#	27	28	28	28	28	30	31	31	31	31	32	32	33	34	34	34	35	35
S. cerevisiae cerevisiae	○	○	○	○		○	○				○	○	○	○		○	○	○
S. cerevisiae bayanus															○			
Yeast hybrid					○			○	○	○								
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	60–82	59–82	60–86	59–82	68–86	59–90	65–90	59–82	59–82	50–81
Fermentation Speed	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Fast	Fast	Mod	Mod	Fast	Mod	Mod	Mod	Mod	Mod	Mod
Competitive Factor	Yes	Yes	Ntrl	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Ntrl	Yes	Yes	Yes	Yes	Ntrl	Ntrl	Yes
MLF Compatibility	Good	Good	Very Good	Very Good	Very Good	Good	Avg	Good	Very Good	Very Good	Good	Below Avg	Good	Avg	Below Avg	Good	Very Good	Very Good
Sensory Effect	Evc, M	Evc, M	Evc, M	Evc, M	E	M	Evc, M	Evc, M	Evc, E	Evc, M	Evc	Evc, M	Evc	Evc	E, M	Evc	Evc, M	Evc, M
Cocoa/Caramel							♦											
Floral	♦			♦			♦							♦		♦		
Freshness	♦			♦		♦				♦			♦		♦			
Fruit-Black			♦					♦	♦	♦		♦			♦	♦		
Fruit-Red				♦	♦		♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦
Fruit-Jammy	♦	♦	♦									♦	♦				♦	
Savory									♦					♦				
Spicy		♦	♦				♦			♦	♦	♦		♦		♦		
Mouthfeel Impact (Roundness And/Or Structured)	♦	♦	♦	♦		♦	♦	♦		♦		♦			♦		♦	♦
Minimizes Herbaceousness			♦	♦														
No-Low H_2S, SO_2 Production Strains					♦					♦								
Cabernet Sauvignon	♦	♦	♦			♦			♦				♦					
Merlot							♦			♦					♦	♦		
Pinot noir											♦							♦
Light-Bodied Reds				♦						♦	♦							♦
Medium-Bodied Reds	♦	♦	♦	♦	♦	♦	♦	♦		♦	♦	♦	♦	♦	♦	♦		
Full-Bodied Reds	♦	♦	♦		♦	♦	♦	♦	♦	♦		♦	♦	♦	♦		♦	
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 AMERICAN & HYBRID WHITE CULTIVARS

	58W3	71B	ALCHEMY I	CROSS EVOLUTION	CVW5	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	27	29	29	29	31	32	33	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 Known	Good	Good
Reduces Malic Acid		♦						♦										
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
Fruity (Esters)	♦	♦			♦	♦	♦	♦		♦	♦	♦		♦	♦		♦	
Tropical (Thiols)			♦	♦			♦	♦					♦	♦	♦		♦	♦
Citrus (Esters And Thiols)			♦				♦			♦	♦		♦	♦	♦		♦	♦
Floral	♦			♦		♦	♦		♦	♦					♦		♦	
Spicy	♦														♦			
Mouthfeel	♦			♦		♦		♦		♦	♦							
Aromella	♦		♦				♦		♦	♦			♦		♦		♦	
Blanc Du Bois			♦		♦		♦					♦	♦		♦	♦	♦	♦
Brianna	♦	♦			♦		♦				♦	♦		♦				♦
Cayuga White		♦		♦	♦		♦		♦	♦	♦	♦		♦	♦		♦	♦
Chardonnel			♦	♦	♦	♦				♦	♦				♦		♦	♦
Edelweiss	♦	♦			♦		♦		♦		♦	♦		♦				♦
Frontenac blanc		♦	♦		♦		♦				♦		♦		♦	♦	♦	♦
Frontenac gris		♦		♦	♦		♦	♦	♦	♦	♦	♦			♦	♦		
Itasca	♦	♦			♦							♦			♦		♦	♦
La Cresent	♦	♦	♦				♦	♦			♦		♦		♦	♦	♦	
Muscadine					♦										♦		♦	
Rosé		♦		♦			♦		♦		♦	♦	♦					
Seyval blanc			♦				♦	♦							♦	♦		♦
Traminette	♦		♦				♦				♦		♦		♦	♦		♦
Vidal blanc			♦		♦		♦				♦							♦
Vignoles	♦	♦	♦	♦	♦		♦		♦		♦		♦	♦	♦		♦	

♦ Recommended
M Mouthfeel
Evc Enhanced Varietal Character
E Esters
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

1. 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 60.*

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

YEAST STRAINS FOR AMERICAN & HYBRID RED CULTIVARS

◆ Recommended
M Mouthfeel
Evc Enhanced Varietal Character
E Esters
Mod Moderate
Ntrl Neutral
Snstv Sensitive
Avg Average

	71B	3001	ALCHEMY III	ALCHEMY IV	BM 4X4	CLOS	CSM	CVRP	EXOTICS MOSAIC	ICV D254	ICV GRE	NT 202	PERSY	RC212	SYRAH	T73	VRB	W15
Pg#	20	21	21	22	23	24	24	24	26	28	28	31	31	32	34	34	35	35
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	50-81
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, M
Fruit-Black						◆	◆	◆		◆		◆	◆			◆		
Fruit-Red	◆	◆	◆	◆	◆	◆	◆	◆	◆		◆	◆	◆	◆	◆	◆	◆	◆
Spicy					◆		◆			◆			◆	◆	◆			
Mouthfeel Impact (Roundness and/or Structured)		◆		◆	◆	◆		◆	◆	◆	◆		◆			◆	◆	◆
Minimizes Herbaceousness				◆	◆		◆			◆	◆							
Reduces Malic Acid Content	◆																◆	
Baco noir	◆	◆		◆					◆			◆	◆	◆				
Black Spanish				◆	◆	◆	◆	◆			◆		◆			◆		
Chambourcin	◆	◆		◆	◆		◆	◆		◆		◆	◆	◆			◆	◆
Concord	◆			◆									◆					
Crimson Pearl			◆	◆			◆		◆	◆		◆	◆	◆		◆		
Frontenac	◆	◆		◆	◆		◆		◆			◆	◆	◆				
Maréchal Foch		◆		◆					◆		◆	◆	◆	◆				
Marquette	◆	◆		◆	◆	◆	◆		◆	◆			◆	◆		◆		◆
Noiret			◆	◆		◆	◆	◆	◆		◆	◆	◆		◆		◆	◆
Norton		◆	◆	◆		◆	◆	◆	◆	◆		◆	◆				◆	
Petite Pearl	◆		◆	◆		◆				◆		◆	◆	◆			◆	
St. Croix				◆		◆	◆			◆	◆	◆	◆					
Verona	◆	◆	◆	◆						◆		◆	◆					

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 polysaccharides which can increase mouthfeel, balance harshness and acidity (within reason), and add to the colloidal stability of the wine.

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

SACCHAROMYCES YEAST

43

Fructophilic yeast for high sugar fermentations

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

Frequently used in high °Brix musts, Zinfandel, Syrah

UVAFERM 43™ favors fructose over glucose, 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 – $49.20 – #15134 10 kg – $592.50 – #15140

43 RESTART

Pre-acclimated fructophilic yeast for restarting stuck fermentations

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

Frequently used in restarting stuck fermentations

UVAFERM 43 RESTART™ is an optimized and pre-acclimated UVAFERM 43 that can efficiently and effectively 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 quicker, and have a lower mortality rate after inoculation
- For best results, use the 43 RESTART protocol for stuck wines (pg 42)
- *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 – $58.90 – #15223 10 kg – $711.00 – #15240

58W3

Spicy and fruity aromatic white wines

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

Frequently used in Pinot gris, Gewürztraminer, Riesling, Muscat, other 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 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 – $52.40 – #15630 10 kg – $626.40 – #15631

71B

Softens high malic acid grapes

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

Frequently used in Pinot gris, Riesling, Grenache, rosé, hybrid or fruity 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™ 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 – $34.30 – #15059 10 kg – $439.20 – #15078

3001

Burgundy selection for enhanced varietal expression in Pinot noir

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 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_2
- *Saccharomyces cerevisiae cerevisiae* strain
- This strain is from the prestigious Côte de Nuits region of Burgundy, France

500 g – $52.40 – #15682

ALCHEMY I

Intensely fruity and floral white wines

Alcohol Tolerance: 15.5%

Nitrogen Needs: MEDIUM

Temp. Range: 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 display tropical, citrus, and floral aromas
- Temperature management is essential and therefore barrel fermentation should be avoided
- Blend of *S. cerevisiae* wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

1 kg – $112.20 – #15174

ALCHEMY II

Tropical white wines

Alcohol Tolerance: 15.5%

Nitrogen Needs: MEDIUM

Temp. Range: 56-61°F

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

ALCHEMY II is a specific blend of yeast strains that enhance volatile thiols such as boxwood, passion fruit, grapefruit, kiwifruit, and guava aromas.

- 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 *S. cerevisiae* wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

1 kg – $112.20 – #15177

ALCHEMY III

Fruity and floral aroma production in bold and high alcohol reds

Alcohol Tolerance: 15.5%

Nitrogen Needs: MEDIUM

Temp. Range: 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), ß-ionone (raspberry), and acetate esters (fruity and candy)
- Wines display good structure and mouthfeel
- Can mask green characters (methoxypyrazines)
- Good fermenter, produces minimal SO_2, and very low levels of foam
- Blend of *S. cerevisiae* wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

1 kg – $112.20 – #15230

ALCHEMY IV

Intense red fruit aroma production for medium-bodied reds

Alcohol Tolerance: 15.5%

Nitrogen Needs: MEDIUM

Temp. Range: 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 *S. cerevisiae* wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

1 kg – $112.20 – #15231

ASSMANSHAUSEN (AMH)

Allows for the expression of indigenous microflora

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 68-86°F

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

ENOFERM AMH™ is a color-friendly strain with a long lag phase, allowing for the expression of indigenous microflora which can 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/must volume for eight hours then added into full volume
- Rehydration in GO-FERM PROTECT EVOLUTION™ and fermentation nourishment is essential as juice/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 – $52.40 – #15632 10 kg – $626.40 – #15633

BA11

Strong fermenter for aromatic white wines

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 59-77°F

Frequently used in Riesling, Viognier, Pinot blanc, Gewürztraminer, rosé, 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
- *Saccharomyces cerevisiae cerevisiae* strain
- Selected in 1997 near the Estação Vitivinicola de Barraida, Portugal

500 g – $49.20 – #15117

BDX

Steady fermenter for enhanced varietal character in Bordeaux reds

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 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, 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 – $52.40 – #15634 10 kg – $626.40 – #15635

BM 4X4

Aromatic complexity and mouthfeel in reds and whites

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 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 and LALVIN BM45™ 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 – $58.90 – #15176 10 kg – $693.00 – #15200

BRG

Classic strain for Burgundy varietals

Alcohol Tolerance: 15%

Nitrogen Needs: HIGH

Temp. Range: 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 and well-balanced mouthfeel
- Red wines display ripe, dark fruit characteristics with good color and mouthfeel 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 – $49.20 – #15669 10 kg – $517.40 – #15670

BRL97

Enhanced color stability and structure in color-sensitive wines

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 62-85°F

Frequently used in Pinot noir, Zinfandel, Nebbiolo, Merlot, Malbec, Grenache

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 – $49.20 – #15102 10 kg – $592.50 – #15205

CEG (EPERNAY II)

Sweet and semi-sweet wine production

Alcohol Tolerance: 13.5%

Nitrogen Needs: MEDIUM

Temp. Range: 59-77°F

Frequently used in whites, rosés

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 – $26.80 – #15081 10 kg – $220.10 – #15093

CLOS

LALLEMAND YSEO

Aromatic complexity and mouthfeel in big reds

Alcohol Tolerance: 17%

Nitrogen Needs: MEDIUM

Temp. Range: 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"
- *Saccharomyces cerevisiae cerevisiae* strain
- Isolated by the University of Rovira i Virgili in Spain from the Priorat region

500 g – $49.20 – #15201 10 kg – $592.50 – #15204

CROSS EVOLUTION

LALLEMAND YSEO

Strong fermenter for round, rich, aromatic whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 58-68°F

Frequently used in Chardonnay, Gewürztraminer, Pinot blanc, Riesling, Sauvignon blanc, rosé, Rhône whites, aromatic whites, cider

CROSS EVOLUTION™ 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 – $52.40 – #15640 10 kg – $626.40 – #15641

CSM

LALLEMAND YSEO

Minimizes greenness and combats color instability in under-ripe fruit

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 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 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 – $52.40 – #15638 10 kg – $626.40 – #15639

CVRP

LALLEMAND

Produces rich red wines with round mouthfeel and smooth tannin

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 64-90°F

Frequently used in Cabernet Franc, Cabernet Sauvignon, Merlot, Petite Sirah, Tempranillo

CVRP™ 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 – $49.20 – #15207 10 kg – $592.50 – #15208

CVW5

Fresh and fruity white and rosé wines under difficult fermentation conditions

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

Frequently used in Chardonnay, Chenin blanc, Pinot gris, rosé, Albariño, Muscat, aromatic whites, fruit wine, 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 25)
- Must be stored at 39-52°F (4-11°C)

500g – $49.20 – #15237 10 kg – $592.50 – #15210

CY3079 (BOURGOBLANC)

Classic strain for barrel-fermented Burgundy whites

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

Frequently used in Chardonnay, Pinot blanc

LALVIN CY3079 (Bourgoblanc)™ 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™ 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 – $49.20 – #15061 10 kg – $592.50 – #15082

DV10

Strong fermenter for crisp, clean wines

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

Frequently used in Chardonnay, sparkling base, 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 H_2S and SO_2 production
- *Saccharomyces cerevisiae bayanus* strain
- French isolate from an area renowned for making sparkling wine

500 g – $49.20 – #15062 10 kg – $592.50 – #15106

EC1118 (PRISE DE MOUSSE)

Original sparkling wine strain

Alcohol Tolerance: 18%
Nitrogen Needs: LOW
Temp. Range: 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 low nutrient conditions EC1118 can produce high amounts of SO_2 (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 – $31.10 – #15053 10 kg – $437.00 – #15076

ELIXIR

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

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 57-77°F

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

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 SO_2, H_2S, 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 – $52.40 – #15214

EXOTICS MOSAIC

Aromatically intense red and white wines suitable for aging

Alcohol Tolerance: 15.5%

Nitrogen Needs: MEDIUM

Temp. Range: 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/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 – $42.80 – #15213 5 kg – $743.40 – #15220

EXOTICS NOVELLO

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

Alcohol Tolerance: 15.5%

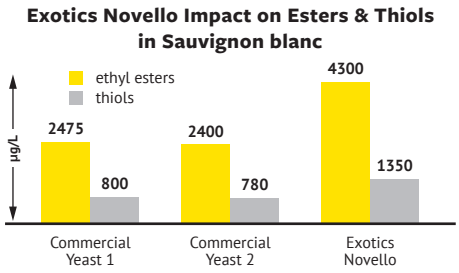
Nitrogen Needs: MEDIUM

Temp. Range: 62-82°F

Frequently used in Sauvignon blanc, Viognier, aromatic whites, Merlot, Syrah, fruity 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_2S producer and has some pectinase activity
- *S. 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)



250g – $42.80 – #15271

FERMIVIN CHAMPION

Fructophilic yeast for restarting stuck ferments

Alcohol Tolerance: 18%

Nitrogen Needs: MEDIUM

Temp. Range: 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 – $32.20 – #17143 10 kg – $444.40 – #17145

FERMIVIN MT48

Fruit-forward and approachable reds

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 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 – $49.20 – #17106

FERMIVIN SM102

Sweet and semi-sweet wine production

Alcohol Tolerance: 12%

Nitrogen Needs: MED

Temp. Range: 61-72°F

Frequently used in sweet white and rosé wines

FERMIVIN® SM102 produces delicate, aromatic wines. It 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 °C (55°F)
- *Saccharomyces cerevisiae cerevisiae* strain
- Isolated from the Cognac region, France

500g – $49.20 – #17140

ICV D21

Freshness and mouthfeel for mature and concentrated reds and whites

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 61-82°F

Frequently used in Chardonnay, Rhône whites, rosé, Merlot, Syrah, Nebbiolo, Zinfandel, Cabernet Sauvignon, structured reds, cider

LALVIN ICV D21™ is a flexible strain that can be used to produce any wine, contributing stable and long-lived aromas, an increased perception of acidity, and a well-balanced mouthfeel. Equally suited for use in barrels or tanks.

- Ripe white grapes develop into wines with fresh citrus aromas
- Red wines are noted for berry and red fruit aromas, stable color, intense fore-mouth volume, mid-palate tannin structure, and fresh aftertaste
- Good for use in under- or over-ripe 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 – $49.20 – #15143 10 kg – $592.50 – #15163

ICV D47

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

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 60–82°F

Frequently used in Chardonnay, rosé, 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 – $49.20 – #15642 10 kg – $592.50 – #15643

ICV D80

Enhances tannin structure in big reds

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 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 stabilizes 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 – $49.20 – #15125 10 kg – $592.50 – #15133

ICV D254

Mouthfeel, roundness, and balance in reds and whites

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 54–82°F

Frequently used in Cabernet Sauvignon, Syrah, Zinfandel, Sangiovese, Chardonnay, Petit Verdot, Malbec, Rhône whites

Wines fermented with LALVIN ICV D254™ are described as having high fore-mouth 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 – $49.20 – #15094 10 kg – $592.50 – #15021

ICV GRE

Fruit-forward reds and whites for early-to-market wines

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 59–82°F

Frequently used in Chenin blanc, Riesling, rosé, Rhône whites, Rhône reds, fruit-forward reds

LALVIN ICV GRE™ 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 SO_2, volatile acidity, and foam production
- *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 – $49.20 – #15101 10 kg – $592.50 – #15142

Low H_2S and SO_2 producer

ICV OKAY

Strong fermenter and fruity ester producer

Alcohol Tolerance: 16%

Nitrogen Needs: LOW

Temp. Range: 54–86°F

Frequently used in Petite Sirah, Grenache, rosé, 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 SO_2, H_2S, 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 – $32.20 – #15221 10 kg – $466.70 – #15222

Low H_2S and SO_2 producer

ICV OPALE 2.0

LALLEMAND YSEO

Enhanced varietal character in whites and rosés

Alcohol Tolerance: 14%

Nitrogen Needs: LOW

Temp. Range: 59–86°F

Frequently used in Chardonnay, Sauvignon blanc, rosé, 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 intense mid-palate and balanced finish
- No to very low SO_2, H_2S, 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 – $49.20 – #15065

ICV SUNROSE

LALLEMAND YSEO

Complex and elegant rosé wines

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 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 – $49.20 – #15280

Low H_2S and SO_2 producer

IOC BE FRUITS

IOC

Fruity ester production for cold-fermented whites and rosés

Alcohol Tolerance: 14%

Nitrogen Needs: LOW

Temp. Range: 54-75°F

Frequently used in Albariño, aromatic whites, rosé, cider

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

- No to very low SO_2, H_2S, and acetaldehyde production
- Optimal conditions for fruity ester production are achieved when juice is clarified (80 NTU ± 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
- Selected by the National Research Institute for Agriculture, Food and the Environment (INRAe), France

500 g – $49.20 – #15241

Low H_2S and SO_2 producer

IOC BE THIOLS

IOC

Enhances varietal character (thiols) in aromatic whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 59-77°F

Frequently used in Sauvignon blanc, Chenin blanc, Riesling, Gewürztraminer, rosé

IOC BE THIOLS™ reveals fruity thiols (citrus and exotic fruits) in white and rosé wines.

- Enhances grapefruit and passion fruit (3MH) aromas without excessive greenness
- No to very low SO_2, H_2S, and acetaldehyde production which heightens the 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
- Selected by the National Research Institute for Agriculture, Food and the Environment (INRAe), France

500 g – $49.20 – #15247

IONYS$_{WF}$

Acid production and mouthfeel enhancement for warm climate reds

Alcohol Tolerance: 16%

Nitrogen Needs: VERY HIGH

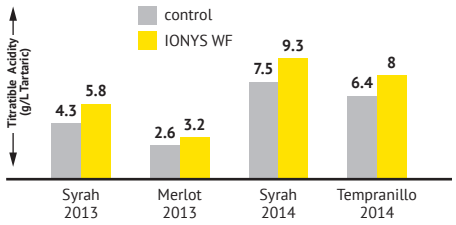
Temp. Range: 77–82°F

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

IONYS$_{WF}$™ 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 SO_2 prior to inoculation should not exceed 40 ppm
- Very high nitrogen requirements (1.4 ppm nitrogen is required per 1g/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°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)
- *Saccharomyces cerevisiae cerevisiae* strain
- Selected in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), France
- Must be stored at 4–11°C (39–52°F)

Acidifying Effects of IONYS$_{WF}$



500 g – $58.90 – #15233

K1 (V1116)

Strong fermenter for high ester production under challenging conditions

Alcohol Tolerance: 18%

Nitrogen Needs: LOW

Temp. Range: 50–95°F

Frequently used in fruity 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 – $30.00 – #15063 10 kg – $285.80 – #15077

MSB

Isolate from Marlborough for zesty, tropical Sauvignon blancs

Alcohol Tolerance: 14.5%

Nitrogen Needs: MEDIUM

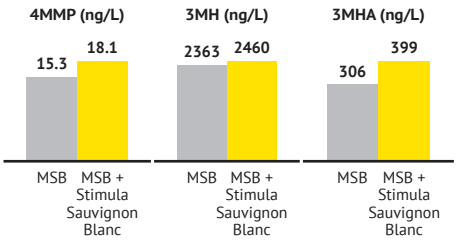
Temp. Range: 57-68°F

Frequently used in Sauvignon blanc, Colombard

LALVIN MSB™ enhances fruity, tropical, and citrus notes while maintaining a balanced mouthfeel.

- Freshness maintained due to minimal malic acid uptake
- *Saccharomyces cerevisiae bayanus* strain
- Isolated from the Marlborough Valley in New Zealand by the Lallemand Oenology R&D team

Effect of STIMULA SAUVIGNON BLANC™ on Thiol Production in a Wine Fermented with LALVIN MSB™



500 g – $49.20 – #15267

MT

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

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 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
- Steady fermentation kinetics and minimal volatile acidity and H_2S 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 – $52.40 – #15650 10 kg – $626.40 – #15651

NT 116

All-purpose strain for New World style whites and reds

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 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
- Very strong fermenter - temperature control is advised when using this low foaming but vigorous strain
- *S. 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 – $100.50 – #15185 10 kg – $711.00 – #15226

NT 202

Structured and complex reds

Alcohol Tolerance: 16%

Nitrogen Needs:MEDIUM

Temp. Range: 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
- Fermentation temperature must be controlled in this low foaming strain
- *S. 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 – $100.50 – #15191 10 kg – $711.00 – #15227

Low H_2S and SO_2 producer

PERSY

Varietal expression and mouthfeel in fruit-forward red wines

Alcohol Tolerance: 17%

Nitrogen Needs: LOW

Temp. Range: 59–82°F

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

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

- Wines have persistent red fruit aromas, spicy notes and a balanced mouthfeel with good mid-palate and integrated tannins
- No to very low SO_2, H_2S, and acetaldehyde production, which further enhances fruit expression
- *S. cerevisiae* hybrid
- Developed in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), SupAgro Montpellier, and Lallemand Oenology

500 g – $49.20 – #15261 10 kg – $592.50 – #15262

QA23

Strong fermenter for varietal expression in highly clarified white juice

Alcohol Tolerance: 16%

Nitrogen Needs: LOW

Temp. Range: 59–90°F

Frequently used in Sauvignon blanc, Chardonnay, 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 passionfruit character and citrus aromas (thiols).

- 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 – $52.40 – #15652 10 kg – $626.40 – #15653

R2

Expression of varietal aromas at cold temperatures

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 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 – $49.20 – #15071

RC212 (BOURGOROUGE)

Enhanced structure and color in Pinot noir

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 60-86°F

Frequently used in Pinot noir, Grenache, Cabernet Franc

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

- 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 – $49.20 – #15057 10 kg – $592.50 – #15097

RHÔNE 2226

Complexity and balance in high alcohol reds

Alcohol Tolerance: 18%

Nitrogen Needs: HIGH

Temp. Range: 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 – $49.20 – #15644 10 kg – $592.50 – #15645

RHÔNE 4600

Aromatic and elegant whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 56-72°F

Frequently used in rosé, 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 SO_2 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 – $49.20 – #15171

R-HST

Strong fermenter for Riesling and other aromatic whites

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 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 – $49.20 – #15130

RP15

Complex, balanced, and concentrated reds

Alcohol Tolerance: 17%

Nitrogen Needs: MEDIUM

Temp. Range: 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, and 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 – $52.40 – #15665 10 kg – $626.40 – #15666

SAUVY

For mega expression of grassy thiols

Alcohol Tolerance: 14%

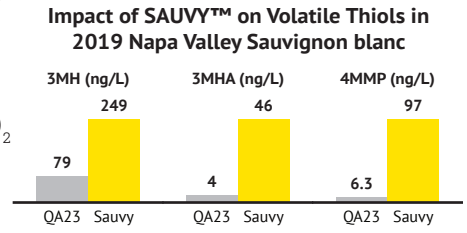
Nitrogen Needs: MEDIUM

Temp. Range: 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. SAUVY™ has a remarkable ability to uptake and reveal volatile thiols, especially 4MMP (grassy thiols/box wood/gooseberry).

- In cooler regions, Sauvignon blanc may have higher levels of the grassy thiol precursor 4MMP and using SAUVY may result an intensely grassy wine
- In warmer regions, Sauvignon blanc may have less 4MMP and SAUVY will produce wines that still express the box wood/gooseberry character but are more balanced, crisp, and refreshing
- In varietals other than Sauvignon blanc, SAUVY can help increase the aromatic expression of otherwise less expressive grapes
- SAUVY produces very low to no H_2S, SO_2 and volatile acidity
- *Saccharomyces cerevisiae cerevisiae* strain



500 g – $53.50 – #15258 10 kg – $639.10 – #15272

SENSY

Varietal aroma production under difficult conditions for whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 54-64°F

Frequently used in rosé, Chardonnay, Sauvignon blanc, Pinot blanc, cider

LALVIN SENSY™ respects varietal aromas and promotes aromatic esters while producing no to very low levels of H_2S even under low temperature and NTU white winemaking conditions.

- SENSY has a very short lag phase
- Total SO_2 prior to inoculation should not exceed 50 ppm
- *S. 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 – $49.20 – #15225

SYRAH

Spicy, fruity, and floral reds

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 59–90°F

Frequently used in Syrah, Grenache, Sangiovese, Merlot, Mourvedre, Petite Sirah, structured reds

ENOFERM SYRAH™ offers good mouthfeel, 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 H_2S under low YAN conditions, hence rehydration with GO-FERM PROTECT EVOLUTION™ and nutrition management is essential
- *Saccharomyces cerevisiae cerevisiae* strain
- Isolated from the Côtes du Rhône region, France

500 g – $52.40 – #15657 10 kg – $626.40 – #15658

T73

Strong fermenter for varietal complexity in hot climate reds

Alcohol Tolerance: 16%

Nitrogen Needs: LOW

Temp. Range: 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 – $49.20 – #15091

TANGO

(formerly TANGO MALBEC)

Balanced reds with perception of sweetness

Alcohol Tolerance: 15.5%

Nitrogen Needs: MEDIUM

Temp. Range: 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 H_2S and SO_2 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 – $49.20 – #15252

VIN 13

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

Alcohol Tolerance: 17%

Nitrogen Needs: LOW

Temp. Range: 54-61°F

Frequently used in Sauvignon blanc, Chenin blanc, Chardonnay, rosé, 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
- *S. cerevisiae* hybrid
- Product of the yeast hybridization program at the Institute for Wine Biotechnology, University of Stellenbosch, South Africa

1 kg – $100.50 – #15183 10 kg – $711.00 – #15228

VIN 2000

Full-bodied aromatic whites

Alcohol Tolerance: 15.5%

Nitrogen Needs: LOW

Temp. Range: 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 SO_2 production and low foaming
- *S. 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 – $100.50 – #15195

VRB

Balance and mouthfeel in high alcohol reds

Alcohol Tolerance: 17%

Nitrogen Needs: MEDIUM

Temp. Range: 59–82°F

Frequently used in Cabernet Franc, Nebbiolo, Tempranillo, Barbera, Sangiovese, Zinfandel, Petite Sirah, fruit-forward reds, 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 – $49.20 – #15173

W15

Clean fermenter at low temperatures

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 50-81°F

Frequently used in Gewürztraminer, Riesling, Pinot gris, Pinot noir, Syrah, rosé, aromatic whites, late harvest, cider

LALVIN W15™ helps retain bright fruit characters, optimizing mid-palate and balance due to high levels of glycerol and succinic acid. This strain is tolerant to 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

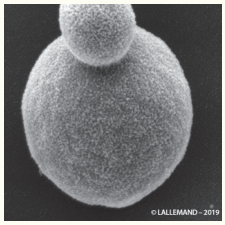
500 g – $49.20 – #15118 10 kg – $592.50 – #15119

NON-*SACCHAROMYCES* YEAST

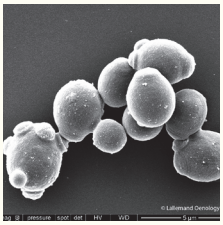
"Non-*Saccharomyces*" are yeast strains associated with vineyards or wineries that are not from the *Saccharomyces* genus. Some wild non-*Saccharomyces* are prized for their interesting aroma and flavor contributions. However, their unpredictable production of ethyl acetate and other undesirable characters pose a risk to wine quality. Our non-*Saccharomyces* strains have been carefully selected to maximize the benefits of wild ferments without risking wine quality.

WHAT'S SO COOL ABOUT NON-SACC YEAST?

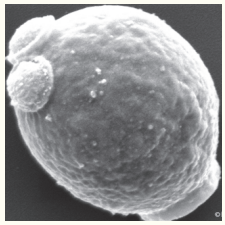
Non-Sacc yeasts have unique abilities that differ from *Saccharomyces* yeast. *Saccharomyces* yeast are reliable fermenters with the ability to impact wine aroma, flavor, and texture. Non-Sacc are not reliable fermenters because they are inhibited by alcohol. However, some non-Sacc yeast from the genera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

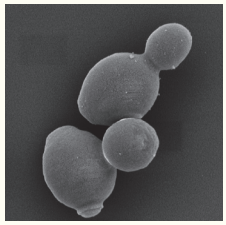


Metschnikowia pulcherrima



Lachancea thermotolerans


M. pulcherrima


Torulaspora delbrueckii

ANTIMICROBIAL

Selected non-Sacc yeast can suppress spoilage organisms, thereby minimizing pre-fermentation volatile acidity (VA) production. Spoilage yeast and bacteria require oxygen. 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

Selected non-Sacc yeast can disrupt the oxidation cascade. 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

Selected non-Sacc yeast can naturally acidify wines due to lactic acid production. LEVEL² LAKTIA™ can produce between 2-9 g/L lactic acid from glucose, which impacts pH and 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

Selected non-Sacc yeast can increase wine aroma and mouthfeel. 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 40).

Optimal conditions for use: Each non-Sacc yeast strain operates best under certain YAN, 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.

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 polysaccharides and aroma compounds (esters). Consumes some sugar to alleviate osmotic (high sugar) stress on *Saccharomyces*	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	Converts glucose to lactic acid
Winemaking application	Enhances mouthfeel, fruity esters and complexity 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 spoilage during transportation or cold soak	Protects white and rosé juice from oxidative damage and microbial spoliage	Acidification (adds freshness and complexity)
When to add Non-*Saccharomyces*	Directly to the fermentation vessel	Directly to the fermentation vessel	Directly to grapes (to protect during transport or cold soak)	To freshly pressed juice to protect during transportation or cold settling	Directly to the fermentation vessel
When to add *Saccharomyces*	After 1.5–3°Brix drop	24 hours after FLAVIA	Upon juice 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 1.5-3 °Brix drop

Optimal conditions:
Free SO_2: <15 ppm
YAN: >150 ppm
Temp: >15-22°C (59-71°F)
Turbidity: >80 NTU

Frequently used in Chardonnay, Viognier, Chenin blanc, Merlot, Grenache, Syrah, Pinot noir, fruit-forward reds, late harvest

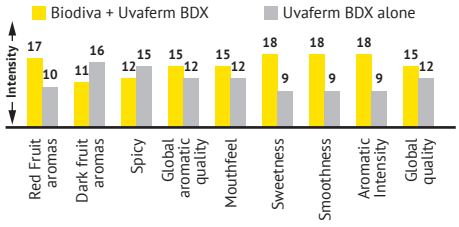
LEVEL² BIODIVA™ produces esters and releases varietal compounds that enhance fruitiness and produces compounds that increase mouthfeel, volume, and roundness.

- In red wines, red fruit aromas and overall aromatic intensity are enhanced, mouthfeel is softened 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 40 for rehydration instructions.
Storage: Store at 20°C (68°F). Once opened use immediately.

Recommended Dosage
250ppm – 25g/hL – 2 lb/1000 gal
500g – $116.50 – # 15697

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



FLAVIA

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

When to add FLAVIA:
Directly to the fermentation vessel

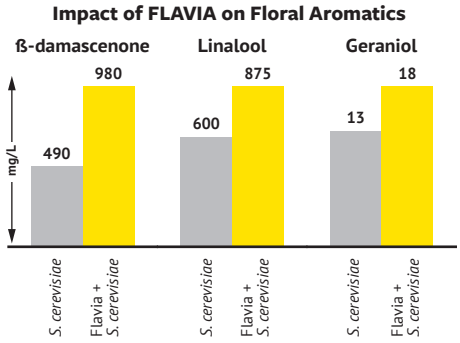
When to add *Saccharomyces*:
24 hours after adding FLAVIA

Optimal conditions:
Free SO_2: <10 ppm
YAN: >150 ppm
Temp: >15-22°C (59-71°F)

Frequently used in Sauvignon blanc, Riesling, Pinot gris, Muscat, Colombard, rosé

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

- Wines have heightened tropical fruit, 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 40 for rehydration instructions.
Storage: Store at 4-11°C (39-52°F). Once opened use immediately.

Recommended Dosage
250ppm – 25g/hL – 2 lb/1000 gal
500g – $116.50 – # 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

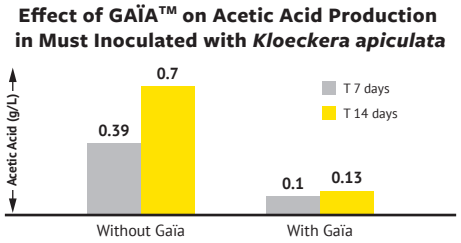
When to add *Saccharomyces*:
After cold soak or whenever fermentation is desired

Optimal conditions:
Total SO_2: <50 ppm
YAN: >150 ppm
Temp: 4-20°C (39-68°F)

Frequently used in Pinot noir, or other 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 <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 40 for rehydration instructions.
Storage: Store at 4-11°C (39-52°F). Once opened use immediately.

Recommended Dosage
250ppm – 25g/hL – 2 lb/1000 gal
500g – $116.50 – # 15686

DID YOU KNOW? GAIA AND INITIA DOSAGES CAN BE ADAPTED DEPENDING ON THE CONDITIONS

- 25 g/hL: maximum bioprotection (antimicrobial action)
- 10 g/hL: temperature: <10°C/50°F; protection needed: <5 days
- 10 g/hL: temperature: ~10°C/50°F; protection needed: <2 days

NEW

INITIA

Manages spoilage and oxidation risks in white and rosé juices

When to add INITIA:
Directly to freshly pressed juice in the press pan

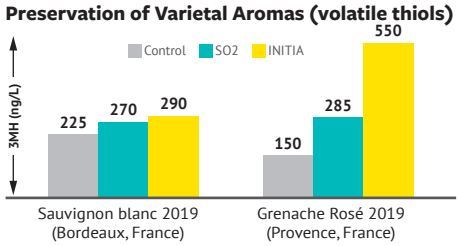
When to add *Saccharomyces*:
Once the juice has been racked to the fermentation vessel

Optimal conditions:
Free SO_2: <15 ppm
YAN:>150 ppm
Temp: 4-20°C (39-68°F)

Frequently used in aromatic whites and rosés

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 suppressing 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
- Has a high demand for nitrogen - YAN should be determined prior to INITIA use and *Saccharomyces* inoculation
- *Metschnikowia pulcherrima* strain
- Isolated in Burgundy by the Institut Français de la Vigne et du Vin (IFV) in Beaune, France



Usage: See pg 40 for rehydration instructions.
Storage: Store at 4°C (39°F). Once opened use immediately.

Recommended Dosage
250ppm – 25g/hL – 2 lb/1000 gal
500g – $116.500 – #15273

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

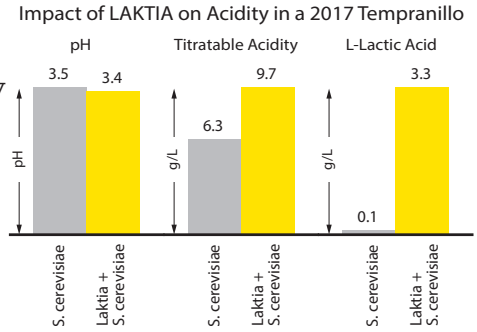
Optimal conditions:
Free SO_2: <15 ppm
Total SO_2: <40ppm
YAN: >150 ppm
Temp: 14-28°C (57-82°F)

Frequently used in hot climate grapes that are lacking acidity

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 1g/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 >3g/L can inhibit malolactic bacteria
- Very low fermentative abilities, grows well at low temperatures and can tolerate up to 7% alcohol
- *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 SO_2. If SO_2 is present, the juice temperature must be >20°C (68°F). Delay *Saccharomyces* inoculation up to 72 hours post-LAKTIA addition.



Usage: See pg 40 for rehydration instructions.
Storage: Store at 20°C (68°F). Once opened use immediately.

Recommended Dosage
250ppm – 25g/hL – 2 lb/1000 gal
500g – $116.50 – #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 need to be 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 YAN, temperature, and free SO_2 conditions.

TIMING OF INOCULATIONS:

	BIODIVA™	FLAVIA™	GAIA™	INITIA™	LAKTIA™
When to add non-*Saccharomyces*:	Directly to the fermentation vessel	Directly to the fermentation vessel	Directly to grapes to protect during transport or cold soak	To freshly pressed juice to protect during transport or cold settling	Directly to the fermentation vessel
When to add *Saccharomyces*:	After 1.5-3 °Brix drop	24 hours after FLAVIA	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)	<15	<10	<50 **Total SO_2**	<15	<15
YAN (ppm)	>150	>150	>150	>150	>150
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:

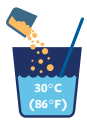
Step 1: Rehydrate your non-Sacc yeast in 10x its weight of chlorine-free water at 30°C (86°F). Stir.

Step 2: Wait 15 minutes and stir again.

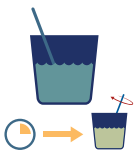
Step 3: Slowly add juice/must to the yeast slurry until the temperature of the yeast slurry drops by 10°C. Wait 15 min. Repeat this step until slurry is within 10°C of must. NOTE: this step should not exceed 45 minutes total.

Step 4: Inoculate.

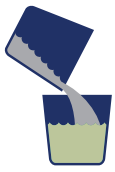
Step 5: After inoculating with your chosen non-Sacc yeast strain, consult the chart above to determine how long to wait before completing a *Saccharomyces* inoculation.



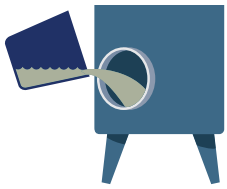
Step 1



Step 2



Step 3



Step 4

PROTOCOL

SACCHAROMYCES YEAST REHYDRATION

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 PROTECT EVOLUTION™ or GO-FERM™ 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.

$$\left(\frac{\text{(gal) Box 1}}{\text{volume of juice/must}} \times 2.5\right) \div 1000 = \frac{\text{(lbs) Box 2}}{\text{weight of GO-FERM PROTECT EVOLUTION}}$$

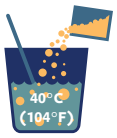
$$\left(\frac{\text{(lbs) from Box 2}}{\text{weight of GO-FERM PROTECT EVOLUTION}} \times 20\right) \div 8.33 = \frac{\text{(gal)}}{\text{volume of water}}$$

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 to drop to 40°C (104°F).
3. Add 25 g/hL (2 lb/1000 gal) of active dried yeast.

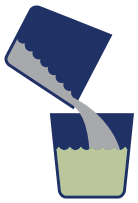
$$\left(\frac{\text{(gal) from Box 1}}{\text{volume of juice/must}} \times 2\right) \div 1000 = \frac{\text{(lbs)}}{\text{weight of yeast}}$$



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/must or populations will decline.

ACCLIMATIZE:

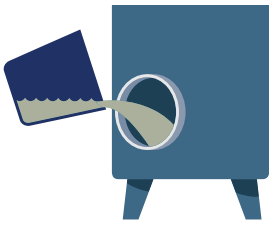
5. Slowly, over 5 minutes, add some juice/must to the yeast slurry to drop the temperature by 10°C (18°F). Let stand 15-20 minutes.
6. Repeat step 5 until the temperature difference between the yeast slurry and the juice/must is within 10°C (18°F). For example, if juice/must temperature is 20°C (68°F)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



Note: *Visit scottlab.com for a video animation of this protocol in English, French, and Spanish.*

PROTOCOL

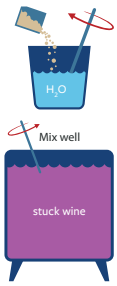
RESTART A STUCK FERMENTATION USING UVAFERM 43 RESTART

PREPARE THE STUCK WINE:

These steps mitigate potential spoilage organisms and remove some toxic compounds commonly present in stuck wines. These compounds are produced by yeast when stressed and can cause stuck fermentations.

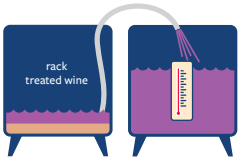
Step 1: Address potential spoilage organism concerns with SO_2 or a 25 g/hL addition of BACTILESS™ or lysozyme.

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.

Step 4: Rack and adjust temperature to 20–25°C (68–77°F). Note new volume after racking.



PREPARE THE STARTER MIXTURE*:

*When adding yeast to a stuck wine environment that contains high alcohol and low sugar, yeast must be **very** carefully acclimated 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.*

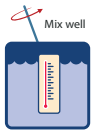
Step 5*: Add a portion of the stuck wine and some water to a new vessel:

- 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 wine prepared in step 5. *Calculate this step based on the volume prepared in step 5, not total stuck wine volume.*

Step 7*: Adjust to 5% sugar (50 g/L) with cane sugar, grape juice concentrate, or grape juice.

Step 8: Mix well. Maintain temperature of 20–25°C (68–77°F).

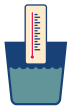


YEAST REHYDRATION

*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 this step based on the volume of stuck wine, not the starter mixture.*

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

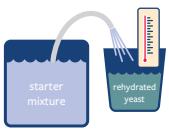


Step 11: Add 40 g/hL (3.3 lbs/1000 gals) of UVAFERM 43 RESTART™ yeast. Stir gently and let stand for 20 minutes, then stir gently again. *Calculate this step based on the volume of stuck wine, not the starter mixture.*

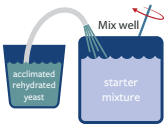
FIRST ACCLIMATIZATION:

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 13: Mix the acclimatized (yeast from step 12) with the rest of the starter mixture (from step 8).



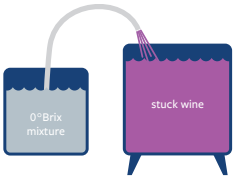
Step 14: Maintain temperature of 20–25°C (68–77°F).

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

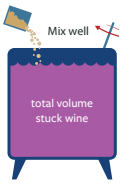
SECOND ACCLIMATIZATION/ INOCULATION:

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 O. Mix to homogenize.



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

***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 water needed for re-suspension

((gal) total volume of stuck wine × 3.3) ÷ 1000 = (lbs) **Box 1** weight of RESKUE

((lbs) from Box 1 weight of RESKUE × 10) ÷ 8.33 = (gal) volume of water

Step 4

Note the new volume after racking

(gal) **Box 2** volume of stuck wine after racking

Step 5

Calculate amount of stuck wine and water needed for starter, then calculate total starter mixture volume

WINE

(gal) from Box 2 volume of stuck wine × 0.05 = (gal) volume of **stuck wine** for starter mixture

+

WATER

(gal) from Box 2 volume of stuck wine × 0.04 = (gal) volume of **water** for starter mixture

= (gal) **Box 3** volume of starter mixture

Step 6

Calculate FERMAID O addition to starter

((gal) from Box 3 volume of starter mixture × 0.66) ÷ 1000 = (lbs) weight of FERMAID O

Step 9

Calculate amount of GO-FERM PROTECT EVOLUTION and amount of water needed for yeast rehydration

((gal) from Box 2 volume of stuck wine × 4.4) ÷ 1000 = (lbs) **Box 4** weight of GO-FERM PROTECT EVOLUTION

((lbs) from Box 4 weight of GO-FERM PROTECT EVOLUTION × 20) ÷ 8.33 = (gal) volume of water

Step 11

Calculate amount of UVAFERM 43 RESTART needed for restart

((gal) from Box 2 volume of stuck wine × 3.3) ÷ 1000 = (lbs) weight of UVAFERM 43 RESTART

Step 17

Calculate FERMAID O addition to reinoculated fermentation.

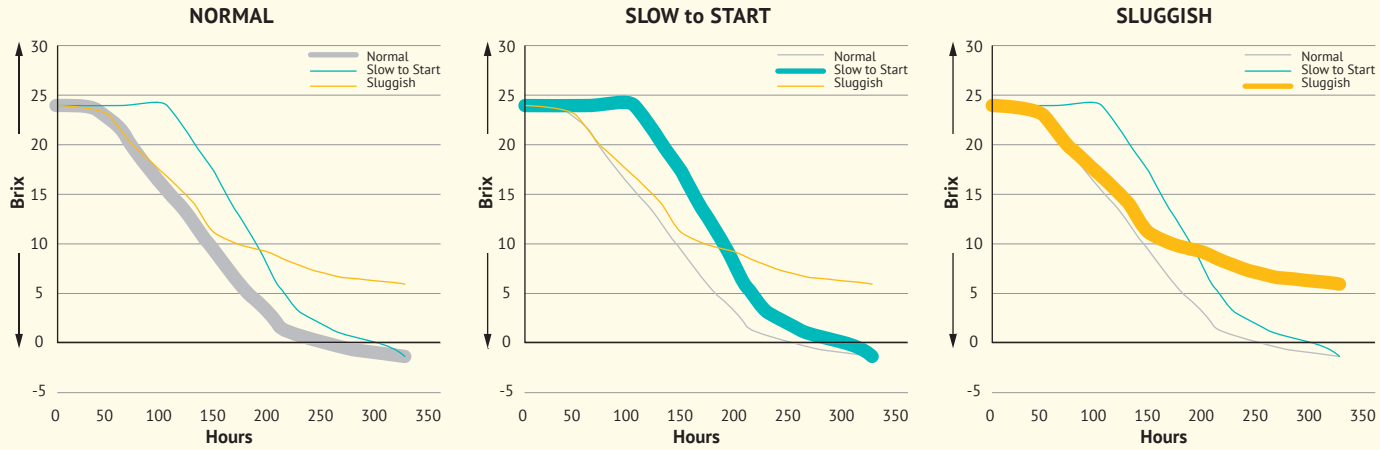
((gal) from Box 2 volume of stuck wine × 3.3) ÷ 1000 = (lbs) weight of FERMAID O

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.

TYPES OF PROBLEM FERMENTATIONS



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™ or STIMULA™) 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 RESKUE™ (pg 55) and stir the fermentation. It is also worth noting that proper use of rehydration nutrients (pg 50) 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/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 (pg 41) 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.

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 42), but not always. Consider the following before conducting a restart:

THE TEMPERATURE IS PROBLEMATIC

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°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™ (pg 55) 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 123) if malolactic fermentation (MLF) isn't complete but is desired, or BACTILESS™ (pg 124) if MLF is complete or not desired. In any condition, uncontrolled LAB should be controlled before trying to restart a stuck fermentation.

RESTART:

If a restart is necessary, use the protocol on pg 42. 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.

YEAST NUTRIENTS

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?

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/must will vary based on geographic location, grape variety, maturity at harvest, and processing decisions.

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.

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 throughout fermentation and the toxic effects of ethanol can be minimized.

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. 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. Prior to fermentation, sugar content and YAN should both be measured. 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 juice/musts. Measuring YAN before these processes may not accurately represent the YAN at inoculation.	**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/must chemistry. Studies have shown that grapes impacted by *Botrytis cinerea* and other molds are highly deficient in YAN and other essential nutrients.
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.	**Fermentation temperature**. Higher fermentation temperatures stimulate fermentation rate and yeast growth, thereby requiring more nitrogen than cooler fermentations.

See pg. 60 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):

$$YAN = [0.8225 \times [NH_3]] + [PAN]$$

Ammonia (NH_3): Typical methods for measuring ammonia (NH_3) 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. 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	REHYDRATION NUTRIENTS		FERMENTATION NUTRIENTS					
PRODUCT NAME	**GO-FERM PROTECT EVOLUTION**	**GO-FERM**	**FERMAID O**	**STIMULA CABERNET**	**STIMULA CHARDONNAY**	**STIMULA SAUVIGNON BLANC**	**STIMULA SYRAH**	**FERMAID K**
STAGE OF WINEMAKING	During yeast rehydration		During alcoholic fermentation					
PRIMARY ACTIVITY	**Advanced rehydration nutrient for maximal yeast vitality**, sustained fermentative power, and aroma production	**Basic rehydration nutrient** to enhance fermentation kinetics and avoid fermentation problems	**Workhorse yeast nutrient** for clean, steady ferments with enhanced aroma production	Stimulates **red and black fruit ester production**, minimizes greenness, and ehances fermentation performance	Stimulates **white/yellow fruit and floral ester production** and enhances fermentation performance	Optimizes the expression of **tropical and citrus thiols, minimizes sulfur off-odor production**, and enhances fermentation performance	Optimizes the expression of **dark fruit thiols, floral aromas, minimizes sulfur off-odor production,** and enhances fermentation performance	**Basic yeast nutrient** for improved yeast performance. Used for supplementing very low YAN fermentations.
BEST USED IN	All wines, **especially** wines with challenging fermentation conditions	All wines, though **not recommended** for alcohol >14% or stressful fermentation temperatures	All wines	Big reds, Bordeaux-style reds	Fruity and floral whites and rosés	Aromatic whites and rosés, especially if thiol-containing	Medium reds, especially if susceptible to H_2S	Wines with very low staring YAN
FORMULATION	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 amount and type of each will vary depending on the product, accounting for their different sensory impacts.					Blend of organic nitrogen (amino acids) and inorganic nitrogen (DAP), with added vitamins, and minerals
MEASURABLE YAN (in ppm) AT 40g/hL	Contains some nitrogen but is not a significant source of YAN and is not a replacement for proper use of fermentation nutrients.		16	16	16	16	16	40
YAN EQUIVALENTS (in ppm) AT 40g/hL			64-96	64-96	64-96	64-96	64-96	
OMRI LISTED*	YES	YES	YES	NO	NO	NO	NO	NO
PG #	50	50	51	51	52	53	53	54

What Are Rehydration Nutrients?

Rehydration nutrients supply yeast with vitamins and minerals, and some formulations provide survival factors (sterols and unsaturated fatty acids). They also contribute some assimilable nitrogen, but they should not be considered significant sources of YAN. Vitamins and minerals are essential for cell function, whereas survival factors support healthy yeast cell membranes. Survival factors and certain minerals improve the yeasts' tolerance to ethanol, whereas vitamins support growth and aroma production. Rehydration nutrients are added when rehydrating yeast.

What Are Fermentation Nutrients?

Fermentation nutrients supply the yeast with nitrogen (YAN). We recommend adding these nutrients to the juice at inoculation and again partway through fermentation. Supplementing YAN at the beginning of fermentation ensures that a sufficient yeast population to sustain fermentation will develop. Supplementing YAN during fermentation avoids yeast stress which may result in off-odor development and stuck/sluggish fermentations. Our STIMULA line of fermentation nutrients can supply 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

YEAST DERIVATIVE NUTRIENTS							
GLUTASTAR	**RESKUE**	**NOBLESSE**	**OPTI-MUM RED**	**OPTI-RED**	**OPTI-WHITE**	**PURE-LEES LONGEVITY**	**REDULESS**
Anytime during fermentation (alcoholic or malolactic)							
Added pre-fermentation, acts as an **antioxidant (protects color and aromas)** in aromatic whites and rosés, and can help **lower SO_2 use**	Removes toxic compounds to **reinvigorate 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)	**Antioxidant (protects color and aromas)**	**Combats sulfur off-odors** and other negative sensory compounds
Aromatic white and rosé juice	All wines	All wines	High tannin reds	Medium and light tannin reds	Complex whites and rosés	Aromatic whites and rosés	All wines
Fully autolyzed yeast rich in reduced gluthione (GSH) and other powerful antioxidant peptides	Inactivated yeast with high bioadsorptive properties for short and medium chain fatty acids	Partially autolyzed yeast rich in high and low molecular weight polysaccharides	Fully autolyzed yeast rich in high molecular weight polysaccharides and oligosaccharides	Partially autolyzed yeast rich in high molecular weight polysaccharides	Partially autolyzed yeast rich in polysaccharides, contains some reduced glutathione (GSH)	Inactivated yeast rich in oxygen scavening components	Inactivated yeast with cell walls rich in copper
Contains some nitrogen but is not a significant source of YAN and is not a replacement for proper use of fermentation nutrients.							
YES	NO	YES	YES	YES	YES	NO	YES
54	55	55	56	56	56	57	57

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.*

YEAST NUTRIENTS & DERIVATIVES

Rehydration Nutrients

GO-FERM PROTECT EVOLUTION

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 prepare to withstand the conditions of fermentation, survival factors to help yeast tolerate ethanol.

YAN contribution:
Insignificant

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

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 H_2S
- 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)
- Latest generation of yeast rehydration nutrient derived from autolyzed wine yeast with optimized bioavailability of micronutrients (vitamins and minerals), survival factors (sterols and unsaturated fatty acids)

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

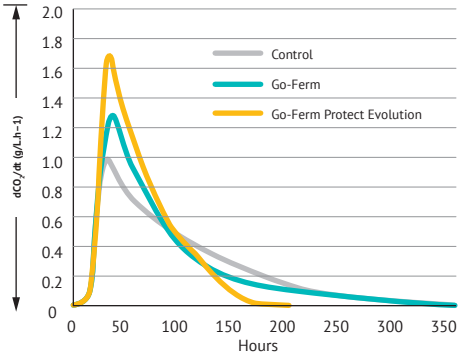


Figure 2:
Impact of GO-FERM PROTECT EVOLUTION on Yeast Viability 115 Hours Post-Inoculation

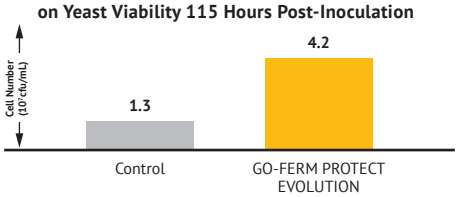
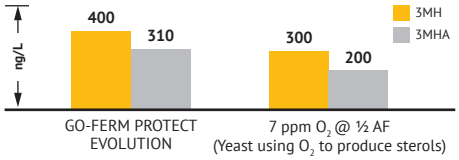


Figure 3:
Impact of GO-FERM PROTECT EVOLUTION vs Oxygen on Varietal Thiol Production



Usage: Mix GO-FERM PROTECT EVOLUTION in 20 times its weight of clean 43°C (110°F) water. Then, follow the applicable rehydration (pg 41) or restart procedure (pg 42).
Note: Due to the unique nature of GO-FERM PROTECT EVOLUTION, it will not go into solution completely. This is due to the fatty acid and sterol content and is to be expected.
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 – $90.50 – #15103 10 kg – $304.80 – #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 prepare to 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 PROTECT EVOLUTION in 20 times its weight of clean 43°C (110°F) water. Then, follow the applicable rehydration (pg 41) or restart procedure (pg 42).
Note: Due to the unique nature of GO-FERM, it will not go into solution completely. This is due to the fatty acid and sterol content and is to be expected.
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 – $45.60 – #15149 2.5 kg – $75.60 – #15135 10 kg – $244.50 – #15161

DID YOU KNOW?

WHAT'S THE DIFFERENCE BETWEEN GO-FERM™ AND GO-FERM PROTECT EVOLUTION™?

Continual R&D to improve the quality of existing products is a keystone of Lallemand Oenology and our GO-FERM products are a prime example. GO-FERM was the first rehydration nutrient introduced to the wine industry. It was developed to enhance fermentation kinetics and avoid fermentation problems. GO-FERM PROTECT EVOLUTION is the latest generation of GO-FERM, contributing to maximal yeast vitality for sustained fermentative power and aroma production. It has been optimized with respect to the quantity and quality of micronutrients and sterols it provides to the yeast during the rehydration phase. We like to think of GO-FERM PROTECT EVOLUTION as GO-FERM'S more sophisticated sibling!

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 and rosés with medium or high YAN. Can be used in low YAN situations in conjunction with STIMULA nutrients

FERMAID O™ 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 off-odors like 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 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.

Recommended Dosage: 10-40 g/hL – 0.83-3.3 lb/1000 gal
2.5 kg – $97.80 – #15067 10 kg – $366.10 – #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:
16ppm
YAN equivalents at 40g/hL dose:
64-96ppm

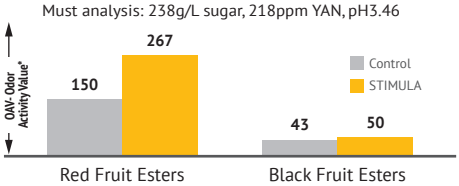
Frequently used in Bordeaux style reds, fruit-forward reds, musts with underripe characters

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



*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: 40g/hL – 3.3 lb/1000 gal
1kg – $46.90 – #15268 10kg – $405.20 – #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/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. 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

LALLEMAND

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

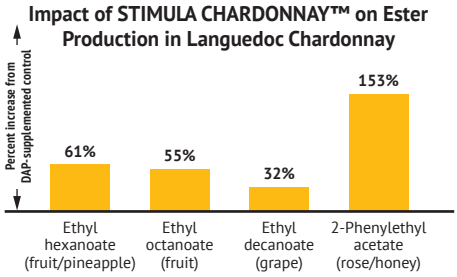
Provides:
YAN in the form of organic nitrogen (amino acids), vitamins and minerals that stimulate yeast to produce white/yellow fruit and floral esters

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

Frequently used in aromatic whites and rosés

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) and 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 ⅓ sugar depletion. It is essential that the timing of addition is respected. STIMULA CHARDONNAY is not fully soluble. Stir to maintain suspension before and during addition.
Storage: Dated expiration. Store in a dry environment at 18°C (65°F). Once opened, use immediately.

Recommended Dosage: 40g/hL – 3.3 lb/1000 gal
1 kg – $46.90 – #15245 10 kg – $405.20 – #15260

STIMULA PINOT NOIR

NEW

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

Frequently used in Pinot noir

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

- When added at the onset of fermentation wines display more red fruit aromas
- When added at 1/3 sugar depletion wines displays darker fruit aromas
- Wines have fewer sulfur off-odors, like H_2S
- Helps to nourish the yeast, minimize yeast stress, and increase ethanol tolerance
- 100% autolyzed yeast-based nutrient that supplies nitrogen in the form of amino acids and small peptides, vitamins, minerals, and sterols

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
500g – $46.90 – #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

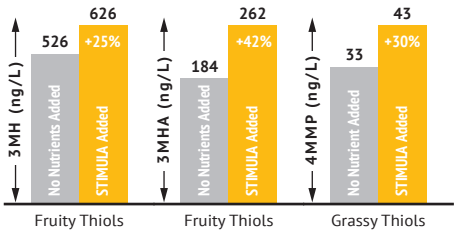
Measurable YAN at 40 g/hL dose:
16 ppm
YAN equivalents at 40 g/hL dose:
64-96 ppm

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 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 H_2S
- 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

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



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.

Recommended Dosage: 40g/hL – 3.3 lb/1000 gal

1 kg – $46.90 – #15246 10 kg – $405.20 – #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

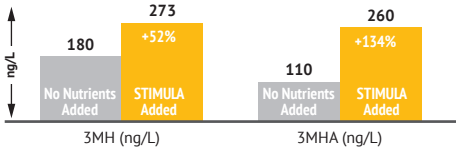
Measurable YAN at 40g/hL dose:
16ppm
YAN equivalents at 40g/hL dose:
64-96ppm

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

STIMULA SYRAH™ 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 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

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



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.

Recommended Dosage: 40g/hL – 3.3 lb/1000 gal

1kg – $46.90 – #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 reds, whites, rosés 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 CO_2 release and overflowing of vessel.
Storage: Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Note: The ingredients in FERMAID K are listed by the TTB as acceptable in good commercial winemaking practice in 27 CFR 24.250 together with 27 CFR 24.246. For more information, please visit TTB.gov. This product contains thiamin. The TTB Maximum Legal Dose for thiamin hydrochloride = 0.60 mg/L (0.005 lb/1000 gal) of wine or juice. 21 CFR 184.1875.

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

2.5 kg – $67.00 – #15073 10 kg – $171.50 – #15070

DIAMMONIUM PHOSPHATE (DAP)

YAN source supplying inorganic nitrogen (ammonia)

Frequently used in severely YAN deficient juice/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.

Usage: Suspend DAP in water or juice/must and mix well before adding, especially during fermentation to avoid CO_2 release and overflowing of vessel.
Storage: Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

5 kg – check website for price – #15805

Yeast Derivative Nutrients

NEW

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 and rosés

GLUTASTAR™ protects aroma precursors and color due to its unique antioxidant capacity.

- 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 be used in no- and low-SO_2 winemaking due to its antioxidant properties
- Unique and highly soluble autolyzed yeast that can be added to juice any time before the onset of fermentation

Figure 1:
Impact of GLUTASTAR on Volatile Thiol Content in a Sauvignon blanc at End of Fermentation

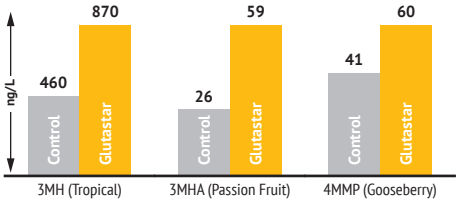
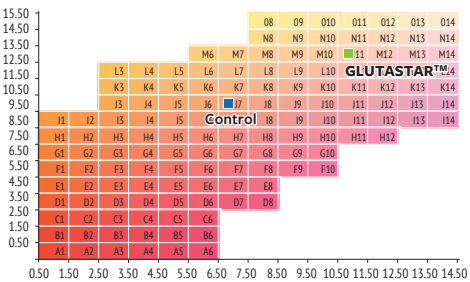


Figure 2:
Color Analysis in a 2018 Provence Rosé of Syrah/Grenache. Trial Compares Control Wine with GLUTASTAR added after Pressing



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.

Recommended Dosage: 30 g/hL – 2.5 lb/1000 gal

1 kg – $75.60 – #15265 10 kg – $480.40 – #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™ 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 42 and 73).
Storage: Dated expiration. Store in a cool and dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage: 30-40 g/hL – 2.5-3.3 lb/1000 gal

1 kg – $45.00 – #15224 10 kg – $333.30 – #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

NOBLESSE™ releases polysaccharides which help to promote harmony between 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

2.5 kg – $108.50 – #15105

OPTI-MUM RED

For increased color stability, integrated 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 and 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 (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 juice and add directly to the grapes or must. If adding later in fermentation, add during a pump-over or during tank mixings. This product is mostly soluble. Stir to maintain suspension before and during addition.
Storage: Dated expiration. Store in a cool, dry environment at 18°C(65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage: 20–40 g/hL – 1.7–3.3 lb/1000 gal

1 kg – $60.70 – #15229 10 kg – $358.70 – #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 and medium-bodied reds

OPTI-RED 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 – $51.10 – #15148 2.5 kg – $108.50 – #15138 10 kg – $312.20 – #15211

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 and rosés

OPTI-WHITE™ helps to prevent oxidative damage*, stabilize and integrate flavors, and bring roundness 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 54) 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 – $51.10 – #15165 2.5 kg – $108.50 – #15136 10 kg – $312.20 – #15216

PURE-LEES LONGEVITY

Gentle fining and oxygen scavenging, compatible with no/low SO_2 winemaking

Nutrient Type:
Yeast Derivative Nutrient

When to Add:
Anytime during alcoholic or malolactic fermentation

Provides:
Specialized inactivated yeast with high dissolved oxygen uptake capacity.

YAN contribution:
Insignificant

Frequently used in whites, reds, rosés, cider

PURE-LEES LONGEVITY™ helps to increase shelf-life and protect color and aroma.

- 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_2
- Inspired by the practice of traditional lees aging, PURE LEES LONGEVITY will continue to scavenge oxygen until its capacity is exhausted
- Although research determined it was more efficient than SO_2 at preserving color and thiols during 5-month aging trials, it is not a direct substitute for SO_2 as it has no antimicrobial activity
- This specialized inactivated yeast was developed in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), France and its actions are complementary to the other antioxidation tools in our portfolio (GLUTASTAR, INITIA, ESSENTIAL ANTIOXIDANT, etc.)

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: 20–40 g/hL – 1.7-3.4 lb/1000 gal

1 kg – $47.80 – #15249

REDULESS

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 with sulfur defects

REDULESS™ is used to reduce sulfur off-odors such as H_2S, mercaptans, and some disulfides.

- Can increase fruitiness due to reduction in sulfur off-odors
- Can naturally enhance roundness
- Has also been shown to reduce phenol-related defects
- Unique inactivated yeast with biologically bound 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 fermenter. Gently mix and rack off or filter after 72 hours. The maximum potential copper contribution when used according to the recommendation is 0.02 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. It 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

1 kg – $83.00 – #15116 2.5 kg – $158.50 – #15115

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.

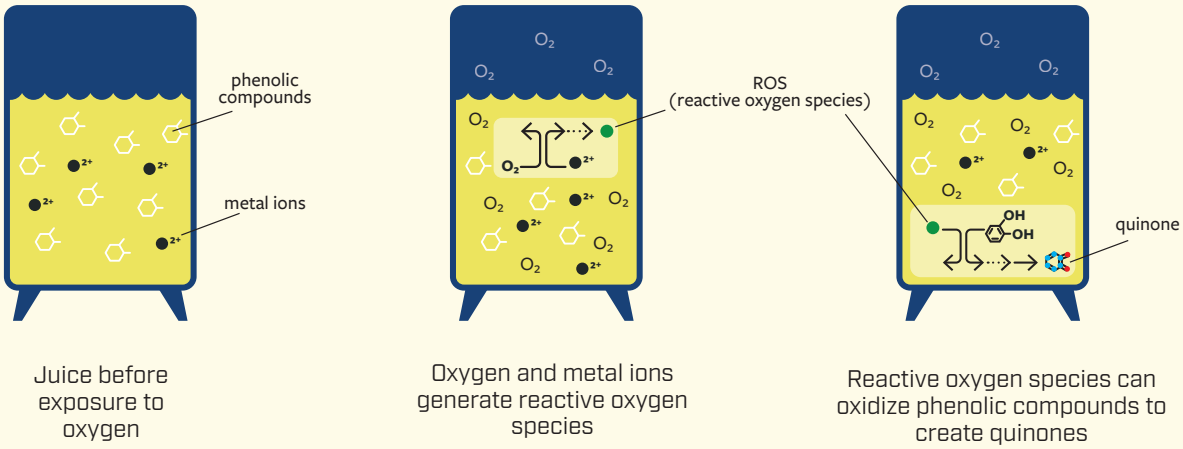
THE OXIDATION CASCADE

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 quinones.

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 polyphenols in wine, producing brown pigments which are especially visible in white and rosé wines.
2. 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.

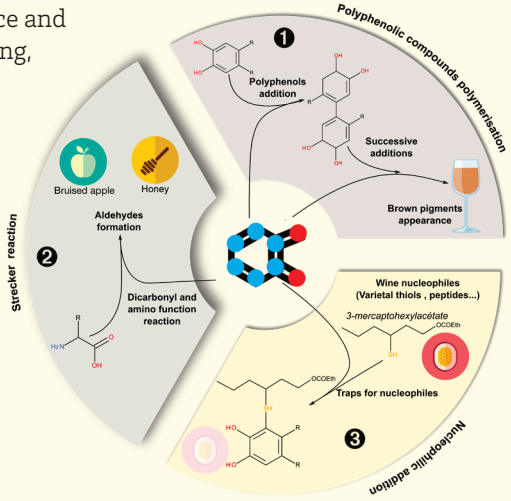


Figure 2. *Quinone Reactions in Wine*

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 prevent quinone reactions by directly binding with 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 sulfyhdryl 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* load 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.

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. **Measure SUGAR (BRIX)** ____ °Brix **and YAN** ____ ppm **of the juice.**

B. **Choose a yeast strain.** Yeast strain product descriptions can be found on pgs 20-35.

C. **Determine the chosen yeast strain's NITROGEN NEED — low, medium, or high.** This information is listed in the product description.

D. **Determine YAN REQUIRED for fermentation** ____ ppm 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 need 220 ppm YAN.

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

To calculate: ____ ppm (YAN REQUIRED) − ____ ppm (JUICE YAN) = ____ ppm (ADDITIONAL YAN)

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.

Table 1: *Measurable yeast assimilable nitrogen (YAN) needs of yeast at different starting sugars*

	YAN Required for Fermentation (ppm N)		
°Brix	Low N need	Medium N need	High N need
20	150	180	250
22	165	200	275
24	180	220	300
26	195	240	325
28	210	260	350
30	225	280	375

2. MAKE NUTRITION PLAN

Using the **ADDITIONAL YAN** 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		
		0-50 ppm	51-100 ppm	101-150 ppm
At Rehydration	All Fermentation Goals	GO FERM PROTECT EVOLUTION – 30 g/hL		
At 2-3 °Brix Drop	Fermentation Security	N/A	FERMAID O – 20 g/hL	FERMAID O – 40 g/hL
	Increase Varietal Aromas	STIMULA SAUVIGNON BLANC or STIMULA SYRAH - 40 g/hL		
	Increase Fruity Esters	N/A	FERMAID O – 20 g/hL	FERMAID O – 40 g/hL
At 1/3 °Brix Drop	Fermentation Security	FERMAID O – 30 g/hL	FERMAID O – 40 g/hL	FERMAID K – 40 g/hL
	Increase Varietal Aromas	FERMAID O – 10 g/hL	FERMAID O – 20 g/hL	FERMAID O – 40 g/hL
	Increase Fruity Esters	STIMULA CHARDONNAY or STIMULA CABERNET - 40 g/hL		

NUTRITION PLAN

	Dosage		Nutrient
At Rehydration	30	g/hL	GO FERM PROTECT EVOLUTION
At 2-3 °Brix Drop		g/hL	
At 1/3 °Brix Drop		g/hL	

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

PROTOCOL

CHANGE ROSÉ FLAVOR PROFILE THROUGH PRODUCT CHOICE

Rosé wines can be made in a variety of styles and the resulting aromas and flavors are primarily dependent upon the varietal, and secondarily upon processing decisions. Rosé wine style is heavily driven by what aroma compounds are targeted by fermentation practices. The main aroma compounds that can be targeted are terpenes, thiols, and esters, and collectively they contribute fruity, floral, and citrus aromas and flavors. Terpenes and thiols are naturally ocurring in grapes but their relative concentrations depend on the grape variety. Esters, on the other hand, are produced by yeast during fermentation.

This guide takes you through process and product recommendations during fermentation to optimize each of those aromatic compounds and achieve the desired rosé style. For a more comprehensive guide, view the rosé style guide on scottlab.com.

WINEMAKING STAGE	ACTION	REASON FOR ACTION	FLAVOR PROFILE			
			FLORAL/CITRUS (TERPENES)	TROPICAL/ CITRUS (THIOLS)	WHITE/YELLOW FRUIT (ESTERS)	RED FRUIT (ESTERS)
			Syrah, Merlot, Sangiovese	Grenache, Mouvedre, Pinot noir	Any	Any
PRE- FERMENTATIONPROCESSES	Add pre-pressing ENZYME	Promote release of varietal aroma precursors, improve juice yields at lower pressures	RAPIDASE® EXPRESSION AROMA or LALLZYME CUVEE BLANC™	RAPIDASE® EXPRESSION AROMA or LALLZYME CUVEE BLANC™	SCOTTZYME® PEC5L	SCOTTZYME® PEC5L
	PRESS					
	Settle and clarify to a target NTU	There is a strong link between solids content and production of fruity aromas	60-120 NTU	60-100 NTU	60-100 NTU	80-120 NTU
	RACK TO FERMENTATION VESSEL					
	Add Non-*Saccharomyces* Yeast	Enhance aromatic complexity	LEVEL² FLAVIA™	LEVEL² FLAVIA™	LEVEL² BIODIVA™	LEVEL² BIODIVA™
ALCOHOLIC FERMENTATION	Add Rehydration Nutrient	Avoid yeast stress by providing vitamins, minerals, and sterols	GO-FERM PROTECT EVOLUTION™ at 30g/hL			
	Add Fermentation Yeast	Yeasts strains differ in their sensory impacts and environmental tolerance. Choose one that meets both needs	Recommended YEAST at 25 g/hL depending on wine style:			
			ELIXIR™ ICV GRE™ ICV OPALE 2.0™ SENSY™	EXOTICS MOSAIC QA23™ BE THIOLS™ SAUVY™	CVW5™ RHONE 4600™ BE FRUITS™	ALCHEMY IV ICV SUNROSE™ W15™
	Fermentation Temperature	Temperature affects yeast and its ability to release or produce positive aroma compounds	59-73°F	62-68°F	56-75°F	60-77°F
			Ensure fermentation temperature is compatible with chosen yeast strain			
			Recommended FERMENTATION NUTRIENT* depending on wine style:			
	Add Fermentation Nutrients At 2-3 °Brix Drop	Provide adequate nutrients to begin fermentation and stimulate aroma production	STIMULA SAUVIGNON BLANC™ at 40 g/hL	STIMULA SAUVIGNON BLANC™ at 40 g/hL	FERMAID O™ at 0-40 g/hL	FERMAID O™ at 0-40 g/hL
	Add Fermentation Nutrients At 1/3 °Brix Drop	Maintain healthy yeast population throughout fermentation and stimulate aroma production	FERMAID O™ at 0-40 g/hL	FERMAID O™ at 10-40 g/hL	STIMULA CHARDONNAY™ at 40 g/hL	FERMAID O™ at 10-40 g/hL
RACKING	Rack 24-48 Hours Post-Fermentation	*This removes protein, pectin, tartrates, dead and vegetative cells that may negatively impact aromas and mouthfeel*				
POST-FERMENTATION	Add post-fermentation enzyme	Assists with clarification and filtration, facilitates continued release of varietal aroma compounds.	RAPIDASE® REVELATION AROMA	RAPIDASE® REVELATION AROMA	LALLZYME MMX™	LALLZYME MMX™

**Depending on the initial YAN, starting sugar and yeast strain choice you may have to adapt these suggestions. See pg 60 for nutrient supplementation planner based on initial YAN, needed YAN, initial sugar and yeast strain needs.*

MALOLACTIC 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!

SELECTING BACTERIA FOR SUCCESS

UNDERSTANDING THE IMPACT OF WINE CONDITIONS ON MALOLACTIC FERMENTATION

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:**

pH

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

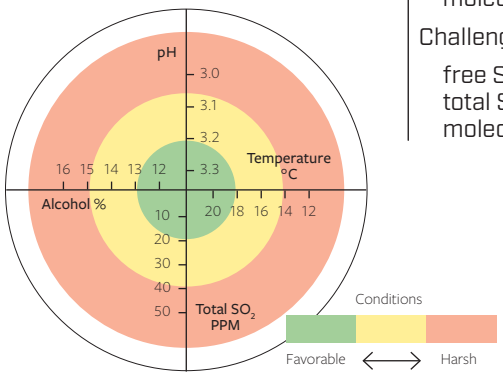
Just like with yeast, ethanol can destabilize the bacteria cell membrane and bacteria strains vary in their ability to tolerate ethanol. Ensure the chosen bacteria strain can tolerate the alcohol content of the wine.

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.

TEMPERATURE	ALCOHOL LEVEL	PH	SO_2
Optimal: 20–25°C (68–77°F)	Optimal: <13% (v/v)	Optimal: >3.5	Optimal: free SO_2 <10 ppm, total SO_2 <45 ppm molecular SO_2 <0.3 ppm
Challenging: <60°F or >85°F	Challenging: >16% (v/v)	Challenging: <3.5	Challenging: free SO_2 >10 ppm, total SO_2 >60 ppm molecular SO_2 >0.3 ppm

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



QUICK GUIDE TO CHOOSING ML BACTERIA

		BETA CO-INOC	ALPHA	BETA	ELIOS 1	LALVIN MBR 31	O-MEGA	PN4	SILKA	SOLO SELECT	VP41	MALOTABS
Pg#		65	66	66	67	67	68	68	69	69	70	70
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 kinetics	Start	Slow	Fast	Slow	Mod	Slow	Fast	Mod	Mod	Mod	Fast	Fast
	Finish	Fast	Slow	Fast	Fast	Fast	Fast	Fast	Mod	Mod	Fast	Mod
Reds		♦	♦	♦	♦	♦	♦	♦	♦	♦	♦	♦
Whites		♦	♦	♦		♦	♦	♦			♦	♦
Rosés		♦	♦				♦				♦	♦
Fruit Wines						♦	♦					
Compatible with Yeast Co-Inoculation		♦										
Restart Sluggish or Stuck MLF											♦	
Diacetyl (buttery) Production			♦	♦		♦		♦				
Enhances Freshness							♦					
Enhances Fruitiness		♦		♦		♦	♦			♦	♦	♦
Enhances Mouthfeel			♦			♦		♦	♦		♦	♦
Enhances Spiciness					♦			♦		♦		
Enhances Structure					♦			♦		♦		
Minimizes Herbaceousness			♦		♦			♦				

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 14-19)
- Choose BETA CO-INOC™ 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-INOC™ will only do this *after* malolactic fermentation is complete (all malic acid has been consumed). If malolactic fermentation finishes before alcoholic fermentation, add BACTILESS™ or DELVOZYME to inhibit the bacteria and prevent VA production.

BETA CO-INOC

LALLEMAND

Co-inoculation strain for fresh and fruit-forward wines

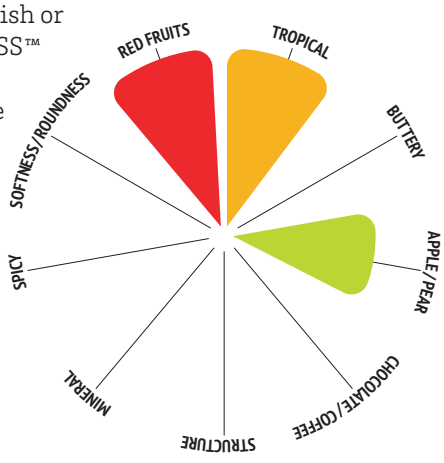
Alcohol Tolerance: <15%
pH: >3.2
Total SO_2 at crush: <60 ppm
Temp: <82°F once alcohol >5% (v/v)

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°C (64–77°F) and recommended ongoing temperatures are between 14–28°C (57–82°F)
- *Oenococcus oeni* strain isolated from the Abruzzi region of Italy

PRO-TIP: If alcoholic fermentation is sluggish or stuck, it may be necessary to add BACTILESS™ (pg 124) or DELVOZYME (pg 123) 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 – $116.60 – #15617
250 hL (6600 gal) dose – $593.90 – #15618

Bacteria for Sequential Inoculation

Many winemakers prefer to add malolactic bacteria (ML) towards the end of alcoholic fermentation. This is known as sequential inoculation. In wines with pH >3.5, residual sugar can be consumed by malolactic bacteria to form volatile acidity (VA). When malolactic fermentation is conducted after alcoholic fermentation, the risk of VA production by ML is minimized. Wines made by sequential inoculation can also give different flavor profiles than co-inoculated wines. Sequential inoculation wine may have higher levels of buttery character (especially when using certain ML strains) and enhanced aromatic complexity.

ALPHA

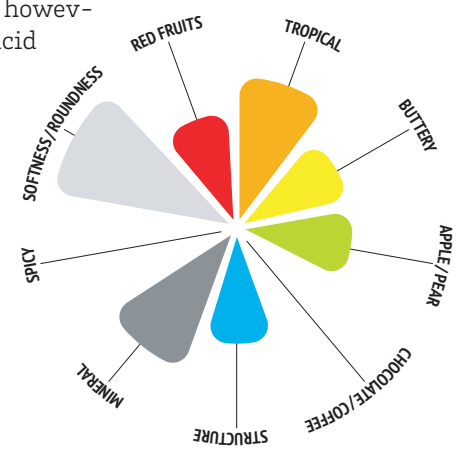
Robust and versatile strain for aroma complexity and mouthfeel enhancement

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

Frequently used in all styles of red, white, and rosé wines

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 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, 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 – $25.90 – #15601
25 hL (660 gal) dose – $131.70 – #15602
250 hL (6,600 gal) dose – $682.50 – #15603

BETA

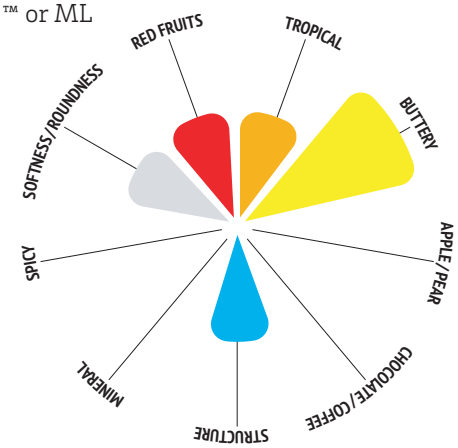
Diacetyl production and enhanced varietal aroma

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

Frequently used in Chardonnay, Merlot, Syrah, other medium-bodied red wines with high aromatic potential

ENOFERM BETA™ preserves and enhances varietal aromas, increases volume and softness, and can impact the diacetyl levels of wines. It is called BETA due to it's 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-MALO BLANC™ or ML RED BOOST™ (pg 71)
- Selected for its robustness and aromatic enhancement while respecting grape varietal characteristics
- *Oenococcus oeni* isolated from the Abruzzi 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 $25.90 – #15604
25 hL (660 gal) dose – $131.70 – #15605
250 hL (6,600 gal) dose – $682.50 – #15606

ELIOS 1

Enhanced fresh fruit, spice, and tannin integration

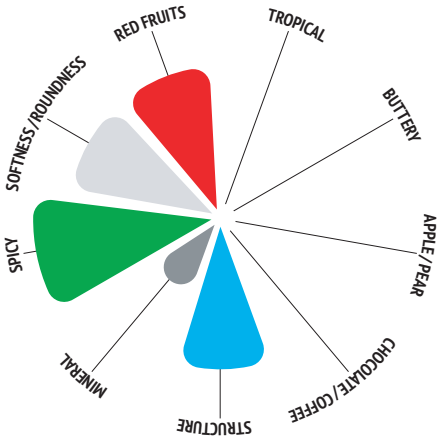
Alcohol Tolerance*: <14%
pH: >3.4
Total SO_2: <50ppm
Temp: >64°F

Frequently used in medium and full-bodied reds

**Alcohol tolerance of ELIOS 1 is improved (up to 15.5%) when the pH >3.5 and TSO_2 <35 ppm*

LALVIN ELIOS 1™ 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 SO_2, using ELIOS 1 may help keep more SO_2 in the free form and therefore make post-MLF SO_2 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 – $116.60 – #15108
250 hL (6,600 gal) dose – $593.90 – #15109

LALVIN (MBR) 31

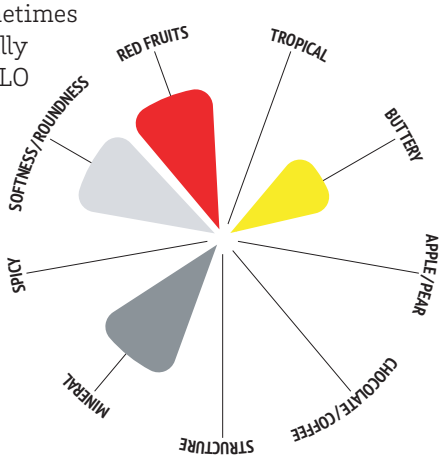
Balanced sensory profile and color stability in low pH wine and low temperature conditions

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

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

LALVIN 31™ 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 to 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 71)
- *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 – $25.90 – #15022
25 hL (660 gal) dose – $116.60 – #15032
250 hL (6,600 gal) dose – $593.90 – #15127

O-MEGA

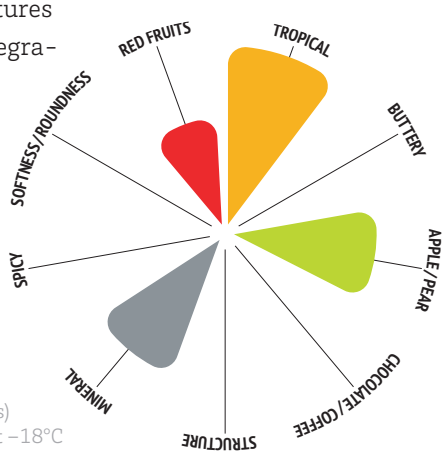
Strong fermenter for freshness and fruit expression

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

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

O-MEGA™ 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 – $131.70 – #15615
250hL (6,600 gal) dose – $682.50 – #15616

PN4

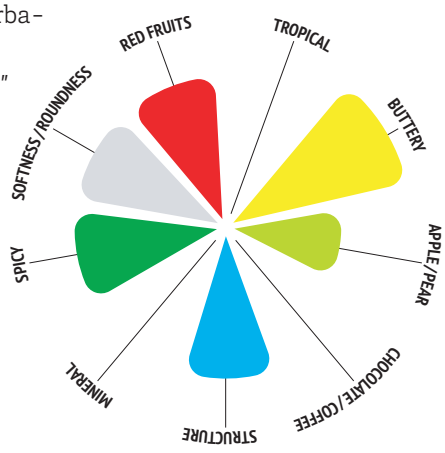
Fast fermenter for enhanced spice, fruit, and mouthfeel

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

Frequently used in complex whites, big and spicy reds

PN4™ 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 – $131.70 – #15607
250 hL (6,600 gal) dose – $682.50 – #15608

SILKA

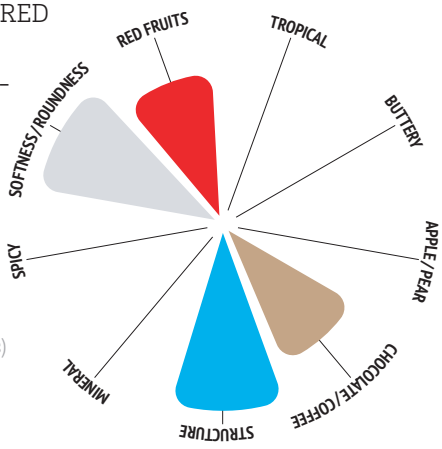
Silky mouthfeel, aromatic balance, and good oak integration

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

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

LALVIN SILKA™ 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 oak toast, 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 71)
- 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 – $143.30 – #15624

SOLO SELECT

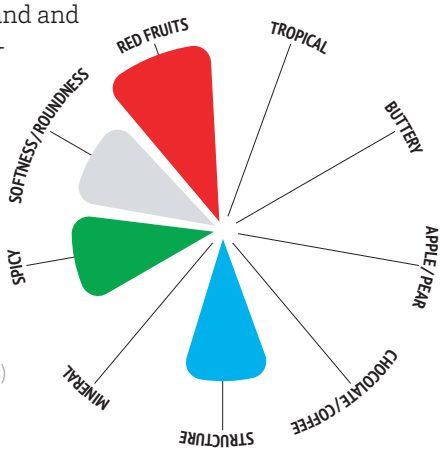
Fast fermenter for enhanced structure and spiciness

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

Frequently used in Syrah, Zinfandel, medium and 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, Australia.

- 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 71)
- 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 – $144.60 – #15270

DID YOU KNOW?

OUR BACTERIA ARE OKAY EVEN IF THE ICE HAS MELTED DURING SHIPPING!

If despite our best efforts, the ice is melted and the container is not cold to the touch when your bacteria arrives, do not be alarmed. Lallemand's proprietary manufacturing process means their bacteria are more tolerant to temperature variations. Provided that temperature variations are moderate (e.g. 30°C/86°F for less than 48 hours), viability should still be excellent. Furthermore, sealed packets can actually be stored for 3 weeks at ambient temperature (<25°C/77°F) without critical loss of viability. So, if shipping or storage problems happen to you, simply put the bacteria in the cooler (-18°C/0°F is preferred, 4°C/40°F is acceptable) and keep it there until you need it.

VP41

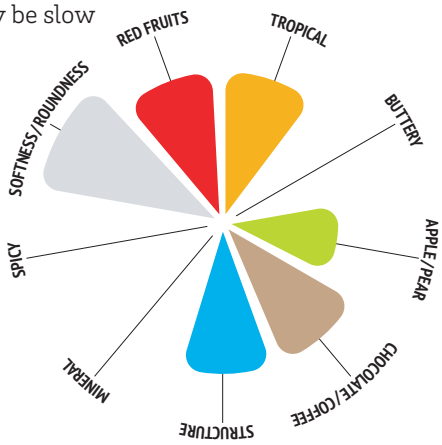
All-purpose strain for enhanced complexity and mouthfeel

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

Frequently used in all styles of red, white, and rosé wines, restarting stuck fermentations

LALVIN VP41™ 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 73)
- At temperatures below 16°C (61°F) it may be slow to start but can complete MLF
- 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 – $25.90 – #15048
25 hL (660 gal) dose – $116.60 – #15042
250 hL (6,600 gal) dose – $593.90 – #15044

MALOTABS

Oenococcus oeni in tablet form for easy barrel additions

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

Frequently used in all styles of red, white, and rosé wines

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 – $160.30 – #15049

Nutrients for Bacteria

The growth and activity of malolactic bacteria is dependent on many factors including wine temperature, pH, SO_2, alcohol, presence of inhibitors and nutrient availability. Malolactic bacteria have complex nutrient needs. If any of the essential nutrients are missing, then malolactic fermentations may struggle or stick completely. Even under ideal conditions, malolactic bacteria grow slowly. Taking care of their nutritional needs will alleviate some of the challenges associated with malolactic fermentation (MLF). We classify our ML strains' relative nutrient requirement as low, medium or high nutrient need. See "Quick Guide to Choosing ML Bacteria" (pg 64) for more information.

ACTI-ML

Bacteria rehydration nutrient

ACTI-ML™ 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

Recommended Dosage:
20 g/hL – 50 g/60 gal – 1.7 lb/1000 gal
1 kg – $58.60 – #15681

Usage: Mix ACTI-ML into 5 times its weight of 20°C (68°F) chlorine-free water. Add bacteria, then wait 15 minutes before adding the suspension to the wine.
Storage: Dated expiration. Store at 18°C (65°F). Once opened, keep tightly sealed and dry.

ML RED BOOST

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

ML RED BOOST™ 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 73).

Recommended Dosage:
20 g/hL – 50 g/60 gal – 1.7 lb/1000 gal
1 kg – $58.60 – #15218

Usage: Suspend in small amount of water or wine and then add directly to the wine 24 hours before adding the malolactic bacteria. ML RED BOOST should not be added to the ML rehydration water (if rehydrating ML).
Storage: Dated expiration. Store at 18°C (65°F). Once opened, keep tightly sealed and dry.

OPTI'MALO BLANC

Malolactic nutrient for white and rosé malolactic fermentations; OMRI listed

OPTI'MALO BLANC™ 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 quicker.

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

Recommended Dosage:
20 g/hL – 50 g/60 gal – 1.7 lb/1000 gal
1 kg – $58.60 – #15217

Usage: Suspend in small amount of water or wine and then add directly to the wine just before adding the malolactic bacteria. OPTI'MALO BLANC should not be added to ML rehydration water (if rehydrating ML).
Storage: Dated expiration. Store at 18°C (65°F). Once opened, keep tightly sealed and dry.

OPTI'MALO PLUS

General malolactic fermentation nutrient

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™ (pg 71) is the preferred MLF nutrient over OPTI'MALO PLUS for red wines and OPTI'MALO BLANC™ (pg 71) is preferred for white and rosé wines

Recommended Dosage:
20 g/hL – 50 g/60 gal – 1.7 lb/1000 gal
1 kg – $58.60 – #15141

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.

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 63, 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:

<table>
<tr>
<td>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).</td>
<td rowspan="2">SO₂ MAY BE TOO HIGH
Even if little or no SO_2 has been added, it may still be present during MLF. SO_2 can come from several sources including yeast, old barrels, and/or erroneous cellar additions.

If total SO_2 (TSO_2) has exceeded the tolerance of the bacteria strain, the wine should be reinoculated with a strain that has a higher TSO_2 tolerance (see pg 73 for restart instructions). TSO_2 may also be lowered via blending.</td>
</tr>
<tr>
<td>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 73 for restart instructions.</td>
</tr>
<tr>
<td>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 73 for restart instructions.</td>
<td>MALIC AND LACTIC ACID MAY BE TOO HIGH
ML bacteria struggle with the malolactic conversion when lactic acid is too high (>3.0 g/L). When starting malic acid is too high (>7.0 g/L), lactic acid produced during MLF can become inhibitory. Lactic acid >1.5 g/L will slow MLF and levels >3 g/L can inhibit MLF. In some cases, a complete MLF may not be possible without blending or other corrective actions.</td>
</tr>
</table>

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 levels of sugar (fructose, glucose). If any nutrients are deficient, bacteria 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 55).

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 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 pg 64 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 ≤0.1g/L (some say ≤0.2 g/L).

PROTOCOL

RECOMMENDED METHOD TO RESTART A STUCK MALOLACTIC FERMENTATION

PREPARE THE STUCK WINE

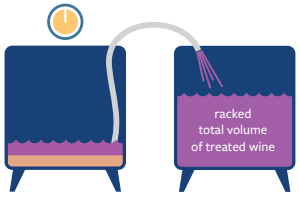
Step 1: Add 30 g/hL (2.5 lb/1000 gal) of RESKUE™ prior to restarting. Suspend RESKUE in 10 times its weight of warm water at 30–37°C (86–98°F) (see pg 55 for more about RESKUE). Wait 20 minutes then add to stuck wine.

((gal) **Box 1** × 2.5) ÷ 1000 = (lbs) **Box 2**

volume of stuck wine — weight of RESKUE

((lbs) from Box 2 × 10) ÷ 8.33 = (gal)

weight of RESKUE — volume of water



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.

((gal) from Box 1 × 1.7) ÷ 1000 = (lbs)

volume of stuck wine — weight of ML RED BOOST

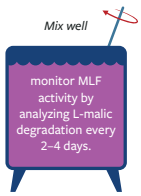
Step 5: Mix gently and wait 24 hours before bacteria addition.

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*.

((gal) from Box 1 × 2) = (gal)

volume of stuck wine — volume for determining how many bacteria packets to add*



**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.

ARTICLE

MALOLACTIC FERMENTATION FEASIBILITY EVALUATION

AVOIDING STUCK MALOLACTIC FERMENTATIONS

As previously mentioned, the factors that influence malolactic fermentation (MLF) feasibility have compounding effects on one another and cannot be looked at individually. For example, a wine with low pH and high SO_2 will be more antagonistic to bacteria than low pH alone. The following scorecard 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 FEASABILITY EVALUATION

Use this chart 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
pH	>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 known not considered on the scorecard 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 via blending, detoxifying using RESKUE, and warming the temperature to 20°C (68°F). Consult a technical representative for additional advice.

OAK & TANNINS

OAK

Scott Laboratories' THERMIC products bring a new perspective to the oak infusion market.

Scott Laboratories' THERMIC range of products are produced by a breakthrough smoke-free thermal modification process. Our process creates a level of consistency superior to other toasting methods and enables the creation of a broader spectrum of flavor profiles.

TANNINS

Scott Labs 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 your favorite tools too!

SELECTING OAK & TANNINS FOR SUCCESS

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 an oak infusion product or tannin depends on the winemaking goal:

STRUCTURE & BALANCE

Oak chips, **tannins** and **THERMIC 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. **THERMIC 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 58–59). Some tannins can even inactivate laccase, an enzyme present in grapes affected by *Botrytis* and other rot that leads to accelerated wine oxidation.

COLOR STABILITY

Fermentation tannins, which are generally a mix of condensed and ellagic 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
Incoming grapes and in press	Red, White, Rosé	Minimize *Botrytis* damage	ESSENTIAL ANTIOXIDANT, FT BLANC, FT ROUGE	
	White, Rosé	Limit oxidation	FT BLANC, FT BLANC SOFT, FT BLANC CITRUS, ESSENTIAL ANTIOXIDANT	
	White, Rosé	Increase citrus aromas and flavors	FT BLANC CITRUS	
	Red	Increase berry aromas and flavors	FT ROUGE BERRY	
Juice/Must	White, Rosé	Limit oxidation	ESSENTIAL ANTIOXIDANT, FT BLANC, FT BLANC SOFT, FT BLANC CITRUS	
	Red, Rosé	Increase berry aromas and flavors	FT ROUGE BERRY, FT ROUGE	
	Red	Limit oxidation, minimize greenness & stabilize color	FT ROUGE, FT ROUGE SOFT, UVA'TAN	FEELWOOD! Balance & Structure or Sweet & Fresh
Fermentation	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 format
	White, Red	Add oak texture, flavors and aromas		
	Red	Minimize greenness	FT ROUGE SOFT, FT ROUGE, FT ROUGE BERRY	FEELWOOD! Balance & Structure, any THERMIC format
	Red, White, Rosé	Add mid-palate	FT ROUGE, FT BLANC SOFT, UVA'TAN SOFT	FEELWOOD! Sweet & Fresh, any THERMIC format
	Red, White, Rosé	Build structure	FT BLANC, FT BLANC SOFT, FT ROUGE, UVA'TAN	FEELWOOD! Balance & Structure, any THERMIC format
	Red	Color stability	FT ROUGE, FT COLORMAX, UVA'TAN	
Aging	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	Any THERMIC format
	White, Red	Increase oak flavors and aromas		
	Red	Minimize greenness	FT ROUGE BERRY	
	Red	Enhance mid-palate	ESTATE	
	Red, White, Rosé	Soften mouthfeel	FT BLANC SOFT, UVA'TAN SOFT	
	Red, White, Rosé	Build structure	ESTATE, FT BLANC SOFT, UVA'TAN	
Finishing (3-6 weeks before bottling)	White, Rosé	Enhance citrus aromas and freshness	FT BLANC CITRUS, FT BLANC, ESSENTIAL ANTI OXIDANT	
	Red, White, Rosé	Increase fruit expression	FT BLANC CITRUS, FT ROUGE BERRY	THERMIC oak cubes
	Red, White, Rosé	Increase oak flavors and aromas and sweetness perception	RICHE, RICHE EXTRA	
	Red, White, Rosé	Enhance mid-palate	FT BLANC SOFT, FT ROUGE BERRY, RICHE, RICHE EXTRA	
	Red, White, Rosé	Soften mouthfeel	FT BLANC SOFT, RICHE EXTRA, UVA'TAN SOFT	
	Red	Mask off flavors	RICHE, RICHE EXTRA	
Pre-bottling (2 days before bottling)	Red, White, Rosé	Enhances freshness, reveals fruits, balances mouthfeel	RADIANCE	
	Red, Rosé	Enhances fruit, adds complexity, minimizes greenness	ONYX	
	Red, White	Increases structure, enhances aromatic complexity and masks off odors	ROYAL	
	Red, White, Rosé	Soften mouthfeel	SEE FLASHGUM R LIQUIDE AND ULTIMA SOFT IN FINING AND STABILITY SECTION (pgs 116-117)	

THERMIC

OAK INFUSION PRODUCTS

Scott Laboratories' THERMIC line of oak infusion products are the most innovative available. 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 staves, cubes, and barrel inserts, each of which are available in five distinct flavor profiles.

THERMIC profiles can be used on their own or blended in tank to produce the desired oak characteristics. 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.

CHOOSING THERMIC PRODUCTS

THERMIC products come in five **profiles** and **three formats**. All profiles and formats can be used during fermentation, aging, and finishing.

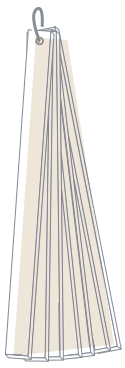
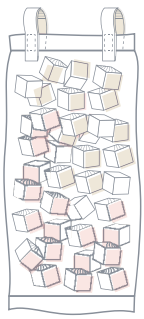
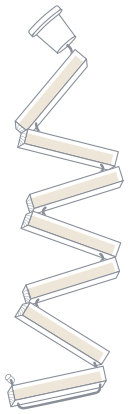
THERMIC PROFILES

THERMIC can be used on reds, whites, and rosés, but some profiles may be better suited for certain wines. For a trial kit, please see scottlab.com

THERMIC Color Profile					
	THERMIC 1	THERMIC 2	THERMIC 3	THERMIC 4	THERMIC 5
Aroma	Coconut, sweet oak	Nutty, toasty, toffee	Vanilla, dark fruits, complexity	Warm spice, vanilla	Espresso, smoked meat, complexity
Mouthfeel	Fresh and light, addition of length	Rounding, boost of mid-palate	Texture, weight, volume, length	Full, viscous, rich	Balanced, rich, round

THERMIC FORMATS

The most appropriate THERMIC format is based on **how quickly** the oak impact is desired, and **what vessel** the wine will be in (tank or barrel).

FAN PACKS	OAK CUBES	BUNG INSERTS
		
Speed of Impact: **SLOW** Compatible With: **TANKS**	Speed of Impact: **FAST** Compatible With: **TANKS**	Speed of Impact: **SLOW** Compatible With: **BARRELS**

THERMIC OAK INFUSION PRODUCTS

THERMIC FAN PACK

oaklab

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 1–18 months. Wine should be frequently tasted and evaluated to determine the exact contact time
- Fan packs are bound by nylon zip ties to allow for easy installation and removal
- Has a surface area of 20 sq. ft, there are 20 fans per pack and each fan within the pack is 36"x 1 1/16" x 13/16"
- Made from American white oak (*Quercus alba*)

Usage: Attach the zip-tie to the D-rings or chains that are pre-installed on tank walls. When fan packs are used during fermentation, ensure that the staves remain well below the cap.
Storage: Store in a cool, dry, odor free environment below 25°C (77°F) away from ignition sources. If stored tightly sealed and dry, shelf life is 5 years. Once opened use immediately.

Recommended Dosage
3.6-14.4 g/L – 2–8 fan packs/1000 gal – 30-120 lb/1000 gal

Thermic Color 1 Fan Pack – 15lb – $101.30 – #Kb2110
Thermic Color 2 Fan Pack – 15lb – $101.30 – #Kb2120
Thermic Color 3 Fan Pack – 15lb – $101.30 – #Kb2130
Thermic Color 4 Fan Pack – 15lb – $101.30 – #Kb2140
Thermic Color 5 Fan Pack – 15lb – $101.30 – #Kb2150

THERMIC OAK CUBES

oaklab

Fast release of oak compounds for use in tanks

Oak cubes allow quick extraction of oak compounds and are compatible for use in tanks. They are particularly useful 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 1–9 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
- Has a surface area of 34 sq. ft, the oak cube dimensions are 1" x 1 1/16" x 13/16"
- Made from American white oak (*Quercus alba*)

Usage: Attach the handle on the mesh bag to the D-rings that are pre-installed on tank walls. When used during fermentation ensure that the cubes remain well below the cap.
Storage: Store in a cool dry, odor free environment below 25°C (77°F) away from ignition sources. If stored tightly sealed and dry, shelf life is 5 years. Once opened use immediately.

Recommended Dosage
4.8-19.2 g/L – 2-8 cube bags/1000 gal – 40-160 lb/1000gal

Thermic Color 1 Oak Cubes – 20lb – $225.00 – #Kb3110
Thermic Color 2 Oak Cubes – 20lb – $225.00 – #Kb3120
Thermic Color 3 Oak Cubes – 20lb – $225.00 – #Kb3130
Thermic Color 4 Oak Cubes – 20lb – $225.00 – #Kb3140
Thermic Color 5 Oak Cubes – 20lb – $225.00 – #Kb3150

THERMIC BARREL INSERTS

oaklab

Slow release of oak compounds for use in barrels

Inserts help achieve the aroma and flavor impact of new oak barrels while using used or neutral barrels. THERMIC 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 20 sections, contained within food-grade mesh netting, and an eyelet screw for easy attachment to barrel bungs (barrel bungs not included)
- Has a surface area of 5.5 sq. ft, each section is 9" x 1 1/16" x 13/16"
- Made from American white oak (*Quercus alba*)

Usage: Attach the eyelet screw to barrel bung and insert into barrel.
Storage: Store in a cool dry, odor free environment below 25°C (77°F) away from ignition sources. If stored tightly sealed and dry, shelf life is 5 years. Once opened use immediately.

Recommended Dosage 1 insert/60 gallon barrel

Thermic Color 1 Barrel Inserts – 3.5lb – $90.00 – #Kb4110
Thermic Color 2 Barrel Inserts – 3.5lb – $90.00 – #Kb4120
Thermic Color 3 Barrel Inserts – 3.5lb – $90.00 – #Kb4130
Thermic Color 4 Barrel Inserts – 3.5lb – $90.00 – #Kb4140
Thermic Color 5 Barrel Inserts – 3.5lb – $90.00 – #Kb4150

FERMENTATION OAK CHIPS

FEELWOOD! BALANCE & STRUCTURE

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
- Initial 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 or by using infusion bags.
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
Whites, Rosé 0.5-1 g/L – 50-100 g/hL – 4.15-8.3 lb/1000 gal
Reds 1-3 g/L – 100-300 g/hL – 8.3-25 lb/1000 gal

10kg (2 x 5kg units, 2 infusion bags) – $127.00 – #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.

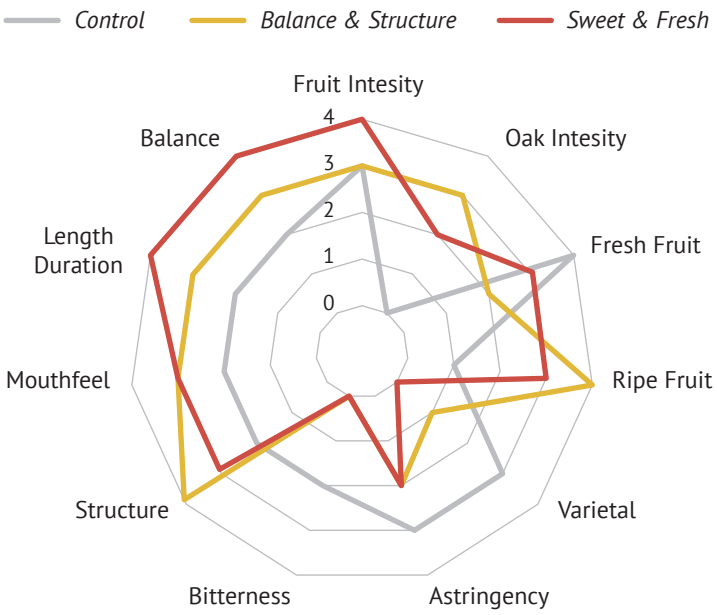
- 100% untoasted French oak chips
- Aged for 24 months

Usage: For whites and rosés, chips must be used with infusion bags. For reds, add into the tank while filling or by using infusion bags.
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
Reds 1-3 g/L – 100-300 g/hL – 8.3 - 25 lb/1000 gal

10kg (2 x 5kg units, 2 infusion bags) – $95.30 – #15940

Impact of FEELWOOD! Oak Chips on Merlot



Impact of 3 g/L FEELWOOD! BALANCE & STRUCTURE and SWEET & FRESH on the flavor and aroma profile of a 2018 Merlot from Bordeaux, France- 2 week contact time.

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 ferementation, 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

ENHANCES FRESHNESS

Tannins can increase the perception of freshness as a consequence of antioxidant and aroma-enhancing effects.

ANTIOXIDATION

Some tannins can interact with quinones and iron, interrupting the oxidation chain to preserve aroma and protect color.

ENHANCES AROMA

Tannins can add aromas and/or enhance volatility of existing aromas.

BUILDS STRUCTURE

Certain tannins can modulate tannin intensity, bitterness and astringency.

BUILDS 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.

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 capabilities. 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.

NEW

ESSENTIAL ANTIOXIDANT IOC

Superior oxidation protection

Stage of winemaking:
Juice or finished wine

Minimum Contact Time:
3 weeks

Impact:
Protects color and aromas

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

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 juice and wine that are susceptible to enzymatic browning
- Minimal impact on mouthfeel
- Highly effective gallnut tannin

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 pump-over. 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°C (41-77°F) in a dry, well-ventilated, odor-free environment. Once opened, the product must be used rapidly.

Recommended Dosage
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 – $139.00 – #15984

ESTATE

Enhances fruit, spice, and mid-palate

Stage of Winemaking:
Aging

Minimum Contact Time:
6 weeks

Impact:
Aroma and structure

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

Usage: During transfer or racking add ESTATE into the wine. Mix well to ensure homogeneity. Following organoleptic evaluations, 2–3 further additions can be made 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
Prior to Barrel Aging Red Wine 50–300 ppm – 5–30 g/hL – 0.42–2.5 lb/1000 gal
Prior to Bottling (3–6 weeks) 50–100 ppm – 5–10 g/hL – 0.42–0.83 lb/1000 gal

1 kg – $146.80 – #15958

FT BLANC

Protection from oxidation and early protein removal

Stage of Winemaking:
Pre-fermentation, Finishing

Minimum Contact Time:
3 weeks

Impact:
Antioxidant protection and protein removal

Frequently used in whites, rosés, reds, fruit wine, 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 83) 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

Usage: Add FT BLANC by sprinkling directly on grapes at the crusher, adding to juice, or adding to wine during a tank mixing. Good homogenization is important. If an addition is made post-fermentation, we recommend waiting 3–6 weeks after the tannin addition before racking, fining, filtering or bottling.
Storage: Dated expiration. Unopened, the shelf-life is 5 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage
Juice(White/Rosé) 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 – $53.50 – #15954 5 kg – $235.80 – #15969

FT BLANC CITRUS

Enhances fruity and floral aromas

Stage of Winemaking:
Pre-fermentation, Finishing

Minimum Contact Time:
3 weeks

Impact:
Aromatic Enhancement

Frequently used in whites, rosés, hybrids, 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 14-19 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

Usage: Dissolve FT BLANC CITRUS in about 10 times its weight of warm water (35–40°C/95–104°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
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 – $123.70 – #15974 5 kg – $529.20 – #15975

FT BLANC SOFT

Oxidation protection and mouthfeel enhancement

Stage of Winemaking:
Pre-fermentation, Finishing

Minimum Contact Time:
3 weeks

Impact:
Antioxidant and Mouthfeel

Frequently used in whites, rosés, reds, hybrids, fruit wine, cider, 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 83) 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

Usage: Add FT BLANC SOFT by sprinkling directly on grapes at the crusher, adding to juice, or adding to wine during a tank mixing. Good homogenization is important. If an addition is made post-fermentation, we recommend waiting 3–6 weeks after the tannin addition before racking, fining, filtering or bottling.
Storage: Dated expiration. Unopened, the shelf-life is 5 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage
Juice (White/Rosé) 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 – $77.60 – #15955 5 kg – $346.90 – #15980

FT COLORMAX

Promote color stability

Stage of Winemaking:
Fermentation

Contact Time:
During fermentation

Impact:
Color Stability

Frequently used in reds, hybrids, fruit wine

SCOTT'TAN™ FT COLORMAX is used 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 84-85).
- Catechin from exotic woods

Usage: Add FT COLORMAX at 1/3 sugar depletion during alcoholic fermentation. 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 – $69.20 – #15968

FT ROUGE

Promotes color, structure, and fruit

Stage of Winemaking:
Fermentation

Contact Time:
During fermentation

Impact:
Color Stability; Structure

Frequently used in medium or full-bodied reds, fruit wine

SCOTT'TAN™ 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
- Provides some antioxidative protection (for maximum antioxidant protection in the case of mold damage and high laccase potential, ESSENTIAL ANTIOXIDANT (pg 83) is the preferred tannin).
- Blend of highly reactive tannins derived from exotic woods and chestnut

Usage: Gradually pour directly on grapes at the crusher or add to the must during a pump-over to obtain good homogenization. If subsequent additions are desired, this can be done in increments of 0.5 lb/1000 gal (~60 ppm) during pump-overs.
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 and 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 – $43.10 – #15950 5 kg – $170.90 – #15951

FT ROUGE BERRY

Enhances red berry fruit, diminishes vegetative notes

Stage of Winemaking:
Fermentation, Finishing

Minimum Contact Time:
3 weeks

Impact:
Aromatic enhancement

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 14–19 and look for yeast identified as enhancing varietal characteristics)
- Masks green/vegetative notes
- Blend of condensed tannins from red berry plants

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
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 – $123.70 – #15972 5 kg – $529.20 – #15973

FT ROUGE SOFT

Promotes color, mouthfeel, and fruit

Stage of Winemaking:
Fermentation

Contact Time:
During fermentation

Impact:
Color Stability, Mouthfeel

Frequently used in light and medium-bodied reds, fruit wine

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
- Can help to protect aromas and color from oxidative damage
- Blend of tannins from exotic woods and oak

Usage: Add to the grapes at the crusher or add to the must during a pump-over. Ensure tannin is mixed in well after addition. If subsequent additions are desired, this can be done in increments of 0.5 lb/1000 gal (~60 ppm) during pump-overs.
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 and 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 – $48.30 – #15952 5 kg – $183.50 – #15953

ONYX

Enhances red fruit, berry aromas and minimizes greenness

Stage of Winemaking: Pre-bottling

Minimum Contact Time: 48 hours

Impact: Complexity, Integration

Frequently used in reds, rosés, hybrids

SCOTT'TAN™ ONYX integrates mouthfeel and flavors, enhances aromatic complexity while respecting varietal characteristics.

- Brings out berry and sweet red fruit aromas
- Can minimize green, herbaceous notes
- Can soften mouthfeel
- Rapidly integrates
- Can be added up to 48 hours before bottling and is great for "last-minute" additions. Always conduct filterability trials prior to addition to avoid filtration challenges.
- Derived from French oak

Usage: Dissolve ONYX in about ten times its weight of warm water 35–40°C (95–104°F) until fully dissolved. Add to wine gradually during a transfer or pump-over. Good mixing is important.
Storage: Dated expiration. Unopened the shelf-life is 4 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage 10–100 ppm – 1–10 g/hL – 0.08–0.83 lb/1000 gal

250 g – $152.00 – #15977

RADIANCE

Enhances freshness, reveals fruit and oak aromas

Stage of Winemaking: Pre-bottling

Minimum Contact Time: 48 hours

Impact: Mouthfeel, 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
- Can be added up to 48 hours before bottling and is great for "last-minute" additions. Always conduct filterability trials prior to addition to avoid filtration challenges.
- Blend of tannins from lightly toasted French oak

Usage: Dissolve RADIANCE in about ten times its weight of warm water 35–40°C (95–104°F) until fully dissolved. Add to wine gradually during a transfer or pump-over. Good mixing is important.
Storage: Dated expiration. Unopened the shelf-life is 4 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage 10–100 ppm – 1–10 g/hL – 0.08–0.83 lb/1000 gal

250 g – $152.00 – #15978

RICHE

Sweetness and finesse

Stage of Winemaking: Finishing

Minimum Contact Time: 3 weeks

Impact: Aroma, Mouthfeel

Frequently used in whites, rosés, reds, hybrids

SCOTT'TAN™ RICHE is notable for enhancing aromatic complexity and 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

Usage: Dissolve in about 10 times its weight of warm water (35–40°C/95–104°F) then add it to the wine and mix well. Good homogenization is important. Final additions should be made at least 3 weeks prior to bottling. After additions, proceed with normal racking.
Storage: Dated expiration. Unopened, the shelf-life is 5 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage
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 – $153.00 – #15962

RICHE EXTRA

Smoothness and richness

Stage of Winemaking:
Finishing

Minimum Contact Time:
3 weeks

Impact:
Aroma, Mouthfeel

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 smooth a wine's finish
- It can contribute the finishing touch to your wine
- Integrates quickly
- Derived from 100% toasted American oak

Usage: Dissolve in about 10 times its weight of warm water 35–40°C (95–104°F) then add it to the wine and mix well. Good homogenization is important. Final additions should be made at least 3 weeks prior to bottling. After additions, proceed with normal racking.
Storage: Dated expiration. Unopened, the shelf-life is 5 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage
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 – $218.00 – #15963

ROYAL

Increases structure, enhances aromatic complexity and masks off odors

Stage of Winemaking:
Pre-bottling

Minimum Contact Time:
48 hours

Impact:
Structure, Balance

Frequently used in whites, reds

SCOTT'TAN™ 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
- Can be added up to 48 hours before bottling and is great for "last-minute" additions. Always conduct filterability trials prior to addition to avoid filtration challenges.
- Extracted from American oak and complements wines aged in used American oak barrels

Usage: Dissolve ROYAL in about 10 times its weight of warm water 35–40°C (95–104°F) until fully dissolved. Add to wine gradually during a transfer or pump-over. Good mixing is important.
Storage: Dated expiration. Unopened the shelf-life is 4 years at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage 10–100 ppm – 1–10 g/hL – 0.08–0.83 lb/1000 gal

250 g – $152.00 – #15979

UVA'TAN

Grape seed and skin tannin to compensate for tannin deficiencies and add structure

Stage of Winemaking:
Fermentation, Aging

Minimum Contact Time:
6 weeks

Impact:
Compensates for tannin deficiencies, adds structure

Frequently used in reds, whites, rosés

SCOTT'TAN™ 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.

- In vintages when grape tannin content is low, seeds are unripe, or in cases where over-ripe grapes were watered-back, UVA'TAN can compensate for tannin deficiency
- UVA'TAN assists with oak tannin integration when used during barrel aging
- It is high in polyphenols but low in astringency
- When used late in the winemaking process additions should be made at least six weeks before bottling. Additions closer to bottling can still be beneficial, but filtration throughput can be reduced
- Composed of grape seed and grape skin tannins

Usage: Pour UVA'TAN evenly on the must/juice at the crusher or into wine during a transfer or racking. If further additions are required, two to three adds can be made after racking. Final additions can be made up to three weeks before bottling, though six weeks are recommended for 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
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 – $198.20 – #15964

UVA'TAN SOFT

Grape skin tannin for mouthfeel enhancement and balancing oak

Stage of Winemaking:
Fermentation, Aging

Minimum Contact Time:
6 weeks

Impact:
Creates roundness and assists with oak integration

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
- When used late in the winemaking process additions should be made at least six weeks before bottling. Additions closer to bottling can still be beneficial, but filtration throughput can be reduced
- Highly reactive tannins prepared from freshly pressed white grape skins

Usage: Pour UVA'TAN evenly on the must/juice at the crusher or into wine during a transfer or racking. If further additions are required, two to three adds can be made after racking. Final additions can be made up to three weeks before bottling, though six weeks are recommended for 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
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 – $221.20 – #15965

FINISHING KIT

Finishing Kit for bench trials

Tools for perfecting a wine

Finishing aids may help with:

- Masking pyrazines/greenness
- Maximizing fruit
- Boosting/increasing mid-palate
- Increasing aromatic intensity
- Increasing body
- Help minimize impact of *Brettanomyces*
- Brighten acid
- Impart oak character
- Increase perception of sweetness

Finishing agents are valuable tools for perfecting a wine. Our Finishing Kit for Bench Trials includes pre-dissolved tannins and stability agents for ease of running bench trials.

Bench trials are a very important step to determine the right fit of any of these products. Finding the correct product to work with the matrix of your wine, as well as the correct dosage, might take several trials.

This kit contains:

- SCOTT'TAN™ FT BLANC (pg 83)
- SCOTT'TAN™ FT BLANC SOFT (pg 84)
- SCOTT'TAN™ FT BLANC CITRUS (pg 84)
- SCOTT'TAN™ FT ROUGE BERRY (pg 85)
- SCOTT'TAN™ COMPLEX (see scottlab.com)
- SCOTT'TAN™ ESTATE (pg 83)
- SCOTT'TAN™ RICHE (pg 86)
- SCOTT'TAN™ RICHE EXTRA (pg 87)
- SCOTT'TAN™ ONYX (pg 86)
- SCOTT'TAN™ RADIANCE (pg 86)
- SCOTT'TAN™ ROYAL (pg 87)
- REDULESS™ (pg 57)
- ULTIMA SOFT (pg 117)
- FLASHGUM R LIQUIDE (pg 115)
- THE OAK LAB™ THERMIC OAK SAMPLES, Profiles 1-5 (pg 79)

$112.40	Finishing Kit for Bench Trials	#SLQDTAN
$135.00	20–200 µL Micropipette	#37101
$135.00	100–1000 µL Micropipette	#37102
$11.00	5–200 µL Micropipette tips (96 tips)	#37111
$13.00	100–1250 µL Micropipette tips (96 tips)	#37112

Storage: Dated expiration (3-6 months from production). Once opened, keep tightly sealed and dry.

PROTOCOL

BENCH TRIAL PROTOCOL

WHY CONDUCT BENCH TRIALS?

We recommend performing bench trials with many of our products including lysozyme, tannins, enzymes, and fining agents. A bench trial is a small-scale test that simulates the effect the product will have on a large volume of wine. Bench trials are used to evaluate the efficacy of treatments, determine proper dose rate, and gain familiarity with addition methods. By working in small volumes, large volume mistakes can be avoided.

Wine matrices differ for many reasons (vintage variations, winemaking practices, etc.), so bench trials must be repeated for every lot of wine. An additive that worked last year or in a different lot may not work again in the same way or at the same dose. Bench trials also demonstrate how an additive will behave during preparation (rehydration) or mixing. Many fining products have unique and sometimes difficult solubility issues which can pose a challenge in the cellar. Bench trials alert the winemaker to potential issues and can help formulate a more efficient plan when additions are made in the cellar.

PROTOCOL:

Step 1: Decide which dosages to prepare for the trial (for example: Control, 100 ppm, 200 ppm and 300 ppm). Consult product technical information for manufacturer's recommended dosages. Ensure a control (untreated sample) is included.

Step 2: Prepare stock solution:

a. Choose the concentration of stock solution to prepare in % (w/v) for powdered products or % (v/v) for liquid products

b. Choose volume of stock solution to prepare (in mL)

c. Calculate how much product is necessary to prepare the stock solution by using the worksheet on pg 91.
PRO TIP: A 2.5%, 5% or 10% stock solution can be prepared by adding 2.5, 5.0, or 10.0 grams of product to total volume of 100 mL, respectively. Liquid products can also be prepared in this way by adding 2.5, 5.0, or 10 mL product to clean water for a total volume of 100 mL.

d. Measure the product. Mix it with a portion of the water needed for the stock solution in a volumetric flask (or graduated cylinder). Allow it to dissolve/mix in. Then, add the rest of the volume of water to bring the solution to the correct volume.

e. Agitate gently to mix.

Step 3: Prepare trial:

a. Determine how much stock solution should be added to each of the trial dosages using either the worksheet on pg 91 or the "cheat sheet" to the right,.

b. Add the appropriate volume of stock solution to the trial bottles, then fill to the proper level with wine (evacuating the head space with gas, if possible).

c. Agitate gently to mix.

Step 4: Taste and/or test after the appropriate waiting period. Consult product tech sheet for recommended contact time.
PRO TIP: For fining agents, this might just be as long as it takes the agent to settle. For tannins, it should be at least several days, but it is even better if the trial can sit for at least one week. For THERMIC, it should be at least 10 days.

Cheat Sheet:

Desired Dosage	Stock Solution	mLs of solution to add to 375 mL bottle	mLs solution to add to 750 mL bottle
100 ppm	2.5%	1.5	3.0
	5.0%	0.75	1.5
	10.0%	0.375	0.75
200 ppm	2.5%	3.0	6.0
	5.0%	1.5	3.0
	10.0%	0.75	1.5
300 ppm	2.5%	4.5	9.0
	5.0%	2.25	4.5
	10.0%	1.125	2.25
400 ppm	2.5%	6.0	12.0
	5.0%	3.0	6.0
	10.0%	1.5	3.0
500 ppm	2.5%	7.5	15.0
	5.0%	3.75	7.5
	10.0%	1.875	3.75

BENCH TRIAL PROTOCOL WORKSHEET

Step 2 (c)

Calculate how much product is necessary to prepare the stock solution

FOR **POWDERED** PRODUCTS (Lysozyme, Tannins, Fining Agents, etc.)

$$\left(\frac{(\%w/v)}{\text{desired concentration of stock solution (\%w/v)}} \times \frac{(mL)}{\text{desired volume of stock solution}} \right) \Big/ 100 = \frac{(g)}{\text{weight of product to add to stock solution (g)}}$$

FOR **LIQUID PRODUCTS** (Liquid enzymes, Gelatins, etc.)

$$\left(\frac{(\%v/v)}{\text{desired concentration of stock solution (\%v/v)}} \times \frac{(mL)}{\text{desired volume of stock solution}} \right) \Big/ 100 = \frac{(mL)}{\text{volume of product to add to stock solution (mL)}}$$

Step 3 (a)

Determine how much stock solution should be added to each of the trial dosages.

This calculation must be repeated for each trial dosage.

FOR **POWDERED** PRODUCTS (Lysozyme, Tannins, Fining Agents, etc.)

$$\left(\frac{(mL)}{\text{trial bottle size}} \times \frac{(ppm)}{\text{desired concentration (ppm)}} \times 0.0001 \right) \Big/ \frac{(\%w/v)}{\text{concentration of stock solution (\%w/v)}} = \frac{(mL)}{\text{stock solution to add to trial bottle}}$$

FOR **LIQUID PRODUCTS** (Liquid enzymes, Gelatins, etc.)

$$\left(\frac{(mL)}{\text{trial bottle size}} \times \frac{(mL/1000\ gal)}{\text{desired concentration (mL/1000 gal)}} \times 0.000024 \right) \Big/ \frac{(\%v/v)}{\text{concentration of stock solution (\%v/v)}} = \frac{(mL)}{\text{stock solution to add to trial bottle}}$$

ENZYMES

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 their specialized and nuanced activities 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 hindered due to the environment. 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:

FUNCTIONS OF ENZYMES IN JUICE AND WINE

CLARIFICATION & 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 allowes more, higher quality juice at lower pressing pressures (smaller hard press fraction).

INCREASE VARIETAL AROMA

Enzymes can increase varietal aromas in two ways:

1. Skin contact enzymes can help release aroma precursors into the must or juice, though some of these aroma precursors will be in an odorless form.
2. 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). LOW TEMP: At temperatures <10°C/50°F enzymes will still work, but slowly. HIGH TEMP: At temperatures >60°C/140°F, the enzyme can be denatured and destroyed. Be mindful when using enzymes at cold temperatures. Some of our enzymes are optimized for use at low temperatures.	**Time: The longer the enzyme is left to work, the more work it can do.** Unfortunately, due to processing demands, time is often the limiting factor. **Mixing: The more often a vessel is mixed, the greater the ability of the enzyme to come in contact with its substrate (pectin).**	**The dosage required varies depending on enzyme concentration, contact time, level of pectin, stage of production, and presence of inhibitory substances.**	**Some products will immediately halt enzyme activity (see pg 99) including:** • **High SO_2 additions** • **Bentonite additions** • **Tannin additions** Time these additions carefully and never mix enzymes directly with any of these additives . To completely stop all 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	96	97	98	96	96	99
Primary Use	Aroma release			Maceration		
	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 moleules	Enhances structure Releases color moleules	Masks greeness Releases color moleules
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
97	98	99	100	97	100	101
Pressing, Clarification, Fining, and Filtration 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

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 (>5%); however, once this inhibition is removed the enzyme can release more aroma compounds
- 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 – $42.90 – #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 and 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 – $27.60 – #16204 250 g – $54.00 – #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 and 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 – $41.30 – #16206 500 g – $116.50 – #16208

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™ 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*
- β-glucanase enzymes from *Trichoderma harzianum* are listed on 27 CFR 24.250

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 – $53.00 – #16207

RAPIDASE CLEAR EXTREME

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 American or hybrid cultivars, cider, or 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

100g – $25.50 – #16257

RAPIDASE EXPRESSION AROMA

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, and 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

100g – $26.50 – #16260

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 terpene containing grapes like Muscat, Riesling, Gewürztraminer, or rosés of Syrah

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 have less than 5% glucose remaining for proper enzyme activity
- Once the desired aroma has been obtained, enzyme action can be halted via 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 treatment.
Storage: Dated expiration. Store refrigerated at 5-15°C (41-59°F). Once rehydrated, use within a few hours

Recommended Dosage —Bench trials recommended for wine
White/Rosé Wine 1–2 g/hL – 35–70 g/1000 gal
Red Wine 2–2.5 g/hL – 70–90 g/1000 gal

100g – $54.00 – #16266

SCOTTZYME CINN-FREE

All-purpose enzyme for white and rosé juice

Add to:
Press or pressed juice

Impact:
Aids in pressing, extracts skin-trapped varietal compounds

Format:
Liquid

Frequently used in Sauvignon blanc, Viognier, Pinot gris, Gewürztraminer, Riesling, Chardonnay, Vignoles

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
- 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
- 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) – $100.00 – #16175 25 kg (22.25 L) – $1411.60 – #16165

SCOTTZYME COLOR PRO

Increased tannin profile, color stability, and reduced "veggie" character in red wine

Add to:
Grapes, red must

Impact:
Increases yields, releases color molecules, masks greeness

Format:
Liquid

Frequently used in all red musts

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 which positively impacts wine structure
- Mouthfeel is positively impacted; wines appear rounder 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) – $86.00 – #16172 25 kg (22.25 L) – $1091.40 – #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, French-American 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, depending on when it is used.

- 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
- 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 cellulase 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) – $86.00 – #16171 25 kg (22.25 L) – $1091.40 – #16161

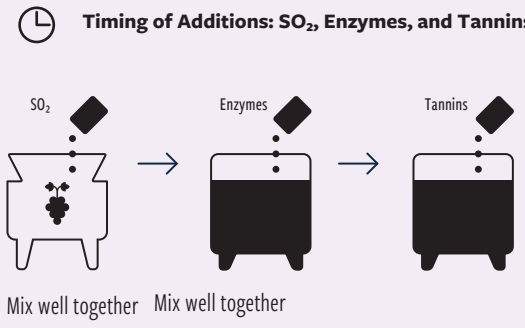
DID YOU KNOW?

HOW TO USE ENZYMES WITH OTHER PRODUCTS (SO_2, 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. Do not add tannins and enzymes together. It is okay to add tannins after the tannins are adequately dispersed or vice versa.

Bentonite: Wait until the 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) – $86.00 – #16174 25 kg (22.25 L) – $1091.40 – #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 white and rosé juice, fruit and hybrid wines, 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
- 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
- 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) – $86.00 – #16170 25 kg (22.25 L) – $961.40 – #16160

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® 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
- It has higher enzyme activities for the most difficult tasks.
- 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
Wine 4 mL/hL – 150 mL/1000 gal

1 kg (890 mL) – $126.90 – #16177 25 kg (22.25 L) – $1764.90 – #16167

DID YOU KNOW?

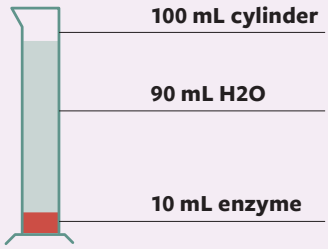
HOW TO ADD ENZYMES (liquid or granular)

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



If using a dose of 10 mL/ton on one ton of grapes, 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 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 SO_2.

ARTICLE

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 located within the grape skins 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 polysaccharides[1].

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.

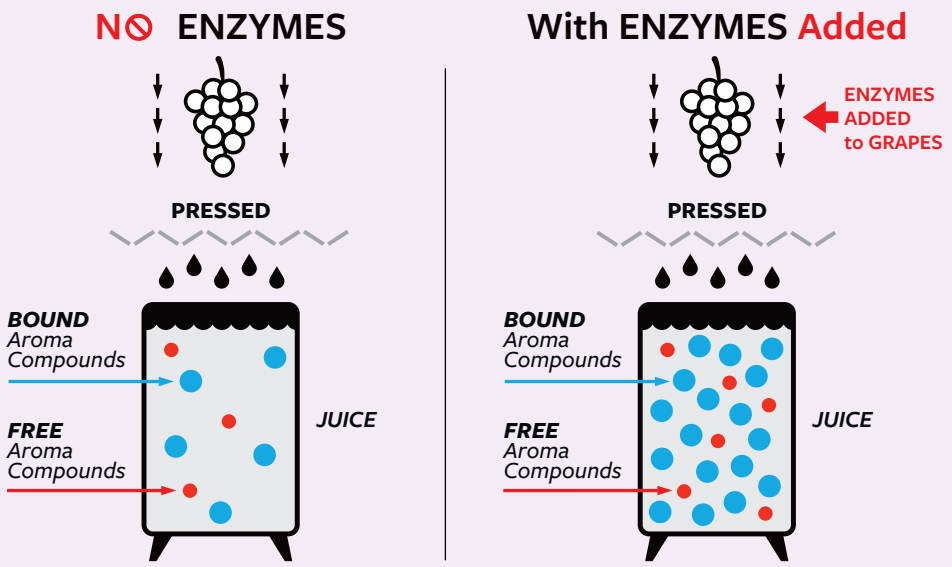
**It is worth noting that beyond concentration of anthocyanin and tannin, there are other factors that affect the success of forming stable anthocyanin complexes.*

ENZYMES CAN IMPROVE WINE AROMA

by increasing varietal aroma

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.**

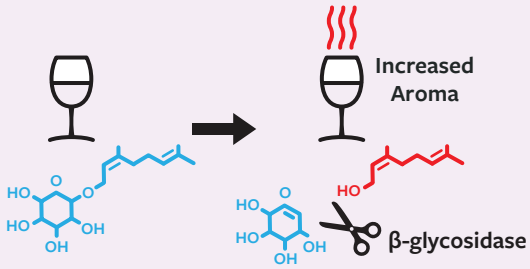
Pectinases are useful as pre-pressing, skin contact enzymes. They gently break down skins and the pectin layer, allowing more aroma compounds to be extracted during pressing. This action releases many types of free and bound aromas including terpenes, thiols, and norisoprenoids. Collectively, these compounds 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 enzymes**[2]. This action is inhibited if sugar 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. Thus, lees aging often leads to rounder, fuller-bodied wines.

β-glucanase enzymes will break down yeast cell walls, allowing 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 94-95 and the in-depth product descriptions on pgs 96-101.

CITATIONS

1. *Mojsov, K., Andronikov, D., Janevski, A., Jordeva, S., & Zezova, S. (2015). Enzymes and wine: The enhanced quality and yield. Savremene Tehnologije, 4(1), 94–100. https://doi.org/10.5937/savteh1501094m*

2. *Liu, J., Zhu, X.-L., Ullah, N., & Tao, Y.-S. (2017). Aroma glycosides in grapes and wine. Journal of Food Science, 82(2), 248–259. https://doi.org/10.1111/1750-3841.13598*

FINING & STABILITY

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 in juice and wine.

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.

FUNCTIONS OF FINING & STABILITY AGENTS IN JUICE AND WINE

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.

TREATMENT AND PREVENTION OF 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 & HAZE PREVENTION

"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:

- 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	NO[OX]
Pg	115	114	109	112	110	110	110	111	111	112
	Clarification				Treat and Prevent Oxidative Damage					
Primary Use	Clarification in wines with low solids, adds "brilliance"	Clarification	Clarification	Clarification	Treat and prevent oxidative damage	Treat and prevent oxidative damage	Treat and prevent oxidative damage	Treat and prevent oxidative damage	Removes color and browning induced by oxidation	Treat and prevent oxidative damage
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
Formulation	Isinglass	Gelatin	Bentonite	Chitosan	Casein	Bentonite-Casein blend	Bentonite-PVPP blend	PVPP-Casein blend	PVPP	Chitosan
Stage of Winemaking	Wine	Wine	Juice, Wine	Juice, Flotation, Wine	Juice, Wine	Juice, Wine	In press, Juice, Wine	Juice, Wine	Fermentation, Wine	In press, Juice, 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

BLANCOBENT UF	FERMOBENT PORE-TEC	GRANUBENT PORE-TEC	CLARISTAR	FLASHGUM R LIQUIDE	ULTIMA SOFT	COLLE PERLE	GELOCOLLE	GRANUCOL FA	GRANUCOL GE
108	109	109	116	116	117	114	115	108	108
Protein Stability (Heat Stability)			Colloidal Stability			Misc. Goals			
Efficient protein removal compatible with crossflow applications	Early protein removal during fermentation	Protein removal	Confers potassium tartrate stability	Confers colloidal stability	Confers colloidal stability	Removal of astringency and bitterness in red wines	Aids settling and prevents overfining (haze due to residual fining agent)	Decolorization	Deodorization
	Compaction of primary lees	Clarification	Enhance perception of sweetness and softness	Enhance perception of sweetness and softness	Enhance perception of sweetness and mouthfeel Minimize bitterness and astringency	Clarification	Compaction of lees		
Bentonite	Bentonite	Bentonite	Mannoprotein	Gum arabic	Mannoprotein-gum arabic	Gelatin	Silica gel	Activated Carbon	Activated Carbon
Wine, Immediately Pre-bottling	During fermentation	Wine	Immediately prior to bottling	Immediately prior to bottling	Immediately prior to bottling	Wine	Flotation, Wine	In press, Juice, Wine	In press, Juice, Wine

Activated Carbon

GRANUCOL FA

Carbon with decolorizing properties

Stage of Winemaking:
Juice, Wine

Contact Time:
24 hours

Impact:
Removes color

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

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.
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 100–1000 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 – $22.30 – #15331 10kg – $207.90 – #15334

GRANUCOL GE

Carbon with deodorizing properties

Stage of Winemaking:
Juice, Wine

Contact Time:
24 hours

Impact:
Removes off-odors and flavors

Frequently used in reds, whites, rosés, fruit wine, 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 100–1000 ppm – 10–100 g/hL – 0.83–8.3 lb/1000 gal
Wine 100–600 ppm – 10–60 g/hL – 0.83–5.0 lb/1000 gal

1 kg – $22.30 – #15332 10kg – $207.90 – #15333

Bentonite

BLANCOBENT UF

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 has fine particles and is free of crossflow-damaging grit and sand.

Competitor Bentonite.

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 crossflow membranes due to the lack of large, abrasive particles (<100 µm)
- Can be prepared in room temperature water
- Always consult your crossflow manufacturer prior to use (approved for use for use with Pall Oenoflow system)
- Not recommended for use on wines that will not be crossflow filtered - use FERMOBENT PORE-TEC or NACALIT PORE-TEC depending on goals

Usage: Add BLANCOBENT UF the night before or day of crossflow filtration. 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 Dosage Bench trials recommended
Wine 200–2000 ppm – 20–200 g/hL – 1.6–16.8 lb/1000 gal

25 kg – $136.50 – #15320

NEW

FERMOBENT PORE-TEC

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 as they are formed.

- May eliminate the need for post-fermentation protein stabilization
- Preferred addition timing is mid-fermentation
- Improves the release of CO_2 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 must 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 Juice 500–3000ppm – 50–300 g/hL – 4.2–25 lb/1000 gal

5 kg – $44.10 – #15321 20kg – $147.00 – #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 Bentonite.

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 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 – $117.60 – #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 wine, 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 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
50–1500 ppm – 50–150 g/hL – 4.2–12.6 lb/1000 gal

5 kg – $50.40 – #15322 20kg – $152.30 – #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 wine, 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 pump-over or a good mixing. BENTOLACT S additions may take up to 7 days to settle.
Once hydrated, BENTOLACT S should not be stored for more than 24 hours.
Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended Dosage Bench trials recommended
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 – $144.10 – #15788

CASÉINATE DE POTASSIUM

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 wine, 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 POTASSIUM can float.
Once hydrated, CASÉINATE DE POTASSIUM should be used within 48 hours.
Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended Dosage Bench trials recommended
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 – $307.20 – #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 wine, 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 mixed.
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
200–1000 ppm – 20–100 g/hL – 1.7–8.3 lb/1000 gal

5 kg – $156.30 – #15791

POLYCACEL

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 wine, 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.
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 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 – $98.70 – #15785 5 kg – $294.80 – #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
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 – $81.80 – #15784

Chitosan

NEW

NO[OX]

Chitosan-bentonite blend to remove oxidized characters in juice and wine; non-animal alternative to casein

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 wine, 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

This product contains ingredient(s) currently listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information, please visit TTB.gov

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.

Recommended Dosage Bench trials recommended
Juice 300–800 ppm – 30–80 g/hL – 2.5–6.7 lb/1000 gal
Wine 200–600 ppm – 20–60 g/hL – 1.67–5.0 lb/1000 gal

5 kg – $260.90 – #16421

NEW

QI'UP XC

Chitosan for superior clarification; non-animal alternative to gelatin

Stage of Winemaking:
Juice 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 wine, 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 can also be used for juice flotation
- When used during flotation the juice must **not** have started fermentation, it must be pectin-free (try 3-4mL/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

This product contains ingredient(s) currently listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information, please visit TTB.gov

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.

Recommended Dosage Bench trials recommended
30–100 ppm – 3–10 g/hL – 0.25–0.83 lb/1000 gal

1 kg – $93.30 – #16430

PROTOCOL

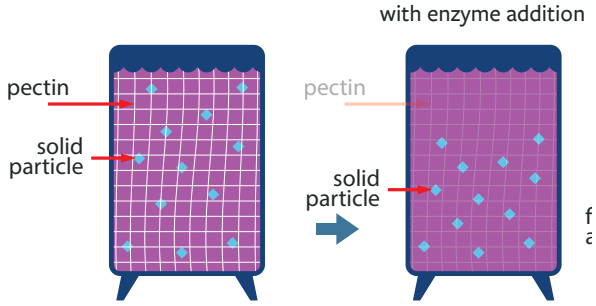
BEST PRACTICES FOR SETTLING WITH FINING AGENTS

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.

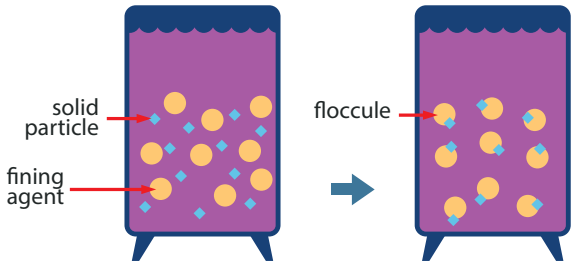
It is difficult to know if a wine has a problematic level of pectin without testing, and bench top trials can be unreliable. Typically, pectin problems are discovered when a fining agent won't settle out. At this point, it may be too late to use enzymes as some fining agents like bentonite can deactivate 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. Pumping using a venturi is an efficient way to disperse agents prior to fermentation. 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 extreme cold temperatures (close to freezing) can inhibit settling and will also inhibit most enzyme activity.

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 wine, 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 gel GELOCOLLE
- 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 115 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 – $24.20 – #15798 5 L – $78.70 – #15799 20 L – $291.40 – #15800

INOCOLLE

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 wine, 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
- 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 115 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
300-1000 ppm – 30–100mL/hL – 1.1-3.8 L/1000 gal

1 L – $27.60 – #15795 5 L – $93.20 – #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 wine, 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 – $81.90 – #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 wine, 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
- 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°C (59–68°F)). Allow to swell for 3 hours. Add additional water if solution is too viscous. Add homogenized solution to wine, taking care to mix well. Rack once lees are well settled.
Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended Dosage Bench trials recommended
15–30 ppm – 1.5–3 g/hL – 0.12–0.25 lb/1000 gal

100 g – $17.90 – #15770 1 kg – $151.00 – #15771

CLARISTAR

OENOBRANDS

Mannoprotein preparation for potassium tartrate stabilization

Stage of Winemaking:
Pre-bottling

Contact Time:
Indefinitely

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

Note 1: CLARISTAR is not appropriate for calcium tartrate stabilization.
Note 2: This product contains ingredient(s) currently listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information please visit TTB.gov.
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 at under 10°C (50°F). Once opened, use within 15 days. Can be frozen once.

Recommended Dosage Bench trials recommended
600–1250 ppm – 60–125 mL/hL – 2.27–4.7 L/1000 gal

2.5 L – $213.90 – #17000 20 L – $1504.70 – #17001

FLASHGUM R LIQUIDE

IOC

Gum arabic for colloidal protection at bottling

Stage of Winemaking:
Pre-bottling

Contact Time:
Indefinitely

Impact:
Colloidal protection, sweetness

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

FLASHGUM R LIQUIDE helps reduce the risk of colloidal deposits in bottled wine.

- Protects color in rosé 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 drop-out
- 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

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

1 L – $25.20 – #15772 5 L – $81.80 – #15773 20 L – $276.70 – #15769

ULTIMA SOFT

Mannoprotein-gum arabic blend for colloidal protection at bottling

Stage of Winemaking:
Pre-bottling

Contact Time:
Indefinitely

Impact:
Balancing and softening

Frequently used in reds, whites, rosés, fruit wine, 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 immediately prior to bottling
- Can be added 24–72 hours before 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

Note: This product contains ingredient(s) currently listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information please visit TTB.gov.

Usage: Add ULTIMA SOFT by mixing with 10 times its weight of water. UltiMA Soft should be the last commercial product added to the wine. Ideally it should be added to the wine using a dosing pump. If the wine is to be filtered, it is recommended that the addition be done 24–72 hours before the membrane filtration and that filterability trials be conducted prior to filtration.

Storage: Dated expiration. Store in a dry, well-ventilated environment with temperatures less than 25°C (77°F).

Recommended Dosage Bench trials recommended
150–300 ppm – 15–30 g/hL – 1.2–2.4 lb/1000 gal

1 kg – $142.60 – #17012

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. However, different types of bentonite should be used based on the winemaking stage and winemaking goals. **FERMOBENT® PORE-TEC** is our recommended bentonite for use during fermentation because of its exceptional purity, good dispersion, effective protein removal, and formation of a stable 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 60 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 FERMOBENT 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 protein 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.*

			Heat stability analysis conducted at the end of fermentation		
Treatment (FERMOBENT addition time)	Starting Brix	Brix when bentonite Added	Turbidity before heating (NTU)	Turbidity after heating (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.

MICROBIAL CONTROL

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 starter cultures, controlled sulfur dioxide additions, acidification, winery hygiene, and filtration are all ways in which microbial control is applied throughout the winemaking process. Though many wine spoilage problems can be prevented with good winemaking practices, there are still circumstances that require extra microbial control. This section describes some of the tools that Scott Laboratories offers to inhibit or eliminate unwanted microorganisms.

MICROBIAL CONTROL ACTION

REMOVAL

Microorganisms are physically removed from the wine. Removal strategies include filtration, centrifugation and some types of fining followed by racking.

INHIBITION

Microbe replication is slowed or stopped, but organisms are not necessarily killed. Microbes may start to grow and multiply once the inhibitory pressure is removed. Inhibition strategies include acidification to lower pH and use of sulfur dioxide and 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 37-39), lysozyme, BACTILESS (if MLF is complete or not desired).

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™ and SO_2 and by limiting oxygen.

LACTIC ACID BACTERIA (LAB)

LAB are responsible for converting malic acid into lactic acid. *Oenococcus oeni* is favorably associated with malolactic fermentation (MLF) but can also produce volatile acidity (VA) under certain conditions. Pediococcus and Lactobacillus are usually considered spoilage organisms. Some LAB can convert sugar to VA. Control growth with BACTILESS™, 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 SO_2. Control growth of *Brettanomyces* with NO BRETT INSIDE.

QUICK GUIDE TO CHOOSING MICROBIAL CONTROL AGENTS

WINEMAKING STAGE	WINE TYPE	WINEMAKING GOAL	RECOMMENDED PRODUCTS
Incoming grapes and in press	Red, White, Rosé	Protect from indigenous yeast and bacteria	INODOSE GRANULES, POTASSIUM METABISULFITE
Juice/Must	White, Rosé	Protect from indigenous yeast and bacteria	LEVEL 2 INITIA™ (See pg 39), INODOSE GRANULES, LYSOZYME, POTASSIUM METABISULFITE
	Red	Protect from indigenous yeast and bacteria	GAIA™ (see pg 38), INODOSE GRANULES, LYSOZYME, POTASSIUM METABISULFITE
Fermentation	Red, White, Rosé	Protect from indigenous yeast and bacteria	INOCULATE WITH YEAST (see pgs 20-35)
	Red, White, Rosé	Protect from lactic acid bacteria during sluggish/stuck fermentation	INODOSE GRANULES, LYSOZYME, POTASSIUM METABISULFITE
	Red, White, Rosé	Delay MLF	INODOSE GRANULES, LYSOZYME, POTASSIUM METABISULFITE
	Red, White, Rosé	Inhibit MLF	BACTILESS™, INODOSE GRANULES, INODOSE TABLETS, LYSOZYME, POTASSIUM METABISULFITE
	Red, White, Rosé	Control *Brettanomyces*	Inoculate ML bacteria with yeast (co-inoculation) or add ML bacteria as soon as alcholic fermentation is complete (see ML section pg 62)
Aging	Red, White, Rosé	Control lactic acid bacteria	BACTILESS™, INODOSE GRANULES, INODOSE TABLETS, LYSOZYME, POTASSIUM METABISULFITE
	Red, White, Rosé	Control acetic acid bacteria	BACTILESS™, INODOSE GRANULES, INODOSE TABLETS, POTASSIUM METABISULFITE
	Red, White, Rosé	Control *Brettanomyces*	INODOSE GRANULES, INODOSE TABLETS, NO BRETT INSIDE™, POTASSIUM METABISULFITE
Pre-Bottling	Red, White, Rosé	Control spoilage organisms	INODOSE GRANULES, INODOSE TABLETS, POTASSIUM METABISULFITE

DELVOZYME LYSOZYME

Lactic acid bacteria inhibitor

DELVOZYME® is used to control or inhibit lactic acid bacteria including Oenococcus spp., Pediococcus spp., and *Lactobacillus spp.*

- Can be used at any stage of the winemaking process
- 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 7 days, after which racking is recommended
- Must be removed from white and rosé wines with 5-10g/hL bentonite, but in red wines it will interact with tannin and settle on its own after approximately 3 days.

Warning: In the case of low color potential grapes such as Pinot noir, caution is advised when adding lysozyme prior to completion of alcoholic fermentation. If spoilage yeasts such as *Brettanomyces* are suspected, SO_2 addition should not be delayed. Lysozyme is only effective against gram-positive bacteria and has no effect on yeast or gram-negative bacteria.

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.

Storage: Store in dry form for 3 years at 18°C (65°F). Once rehydrated, Lysozyme should be used immediately.

5 kg – $1120.10 – #16404

Lysozyme Applications		Lysozyme Dose			Timing of Addition
Inhibit Growth of LAB in Must and Juice Inhibit spoilage characters due to uncontrolled microbial growth. This is especially important in high pH conditions or with grapes containing rot.		200 ppm	20 g/hL	0.75 g/gal	Add prior to fermentation
Protection During Stuck/Sluggish Fermentations Reduce the risk of VA production by lactic acid bacteria and limit use of SO_2 to encourage yeast growth		250–400 ppm	25–40 g/hL	0.94–1.50 g/gal	Add at first signs of a stuck fermentation
Delay MLF/Post-MLF Stabilization Protect wine without the negative effects of SO_2 during maceration or aging; allow for implantation of selected bacteria; delay MLF to increase efficiency of Phase I micro-oxygenation	Delay	100–200 ppm	10–20 g/hL	0.38–0.75 g/gal	Add at juice stage or immediately after alcoholic fermentation
	Stabilize	250–500 ppm	25–50 g/hL	0.94–1.90 g/gal	Add immediately after MLF completion
Inhibit MLF when Blending Partial and Complete ML Wines		300–500 ppm	30–50 g/hL	1.10–1.90 g/gal	Add during blending

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. 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.

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 - Can be used in settled white and rosé juice to control bacterial populations in aromatic wines that will not undergo malolactic fermentation (MLF)
  - Use in wines after alcoholic fermentation to control bacteria populations when MLF is not desired
  - Use in wine after malolactic fermentation to reduce bacterial populations
- Should never be used prior to MLF completion without consulting Scott Laboratories
- Recommended contact time is 10 days
- Offers an interesting alternative to lysozyme treatment and/or significant SO_2 additions, but does not replace the use of SO_2 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*

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. If malolactic fermentation is desired, BACTILESS should not be added until after MLF is complete.
To assess BACTILESS effectiveness wait 20–30 days post-racking before microbial analysis by traditional plating, microscopic observations or RT-PCR.
Storage: Dated expiration. Store in a dry environment below 25°C (77°F).

Recommended Dosage
200–500 ppm – 20–50 g/hL – 0.67–4.16 lb/ 1000 gal – 45–113 g/60 gallon barrel
500 g – $89.00 – #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 after a BACTILESS™ addition?

This is still to be determined; however, we advise waiting until malolactic fermentation is complete before using BACTILESS. If you have a lactic acid bacteria issue prior to inducing MLF you may wish to consider the use of lysozyme or SO_2.

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

NO BRETT INSIDE™ is an allergen-free, innovative microbial control agent used to reduce *Brettanomyces* spp. thereby preserving the aromatic qualities of wines.

- Use in wines after alcoholic fermentation to reduce *Brettanomyces* populations when MLF is either already complete or is not desired
- Should never be used prior to MLF completion without consulting Scott Laboratories
- Recommended contact time is 10 days
- Offers an interesting alternative to significant SO_2 additions, but does not replace the use of SO_2 as it does not have antioxidant or antibacterial properties
- NO BRETT INSIDE is sensory neutral and cannot decrease any sensory contribution (barnyard, medicinal, smoky) already produced by spoilage *Brettanomyces*
- NO BRETT INSIDE will reduce, but not permanently eliminate, *Brettanomyces* populations. NO BRETT INSIDE should be followed by other microbial control strategies, such as sterile filtration, to stop *Brettanomyces* populations from regrowing.
- 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 pump-over or tank/barrel mixings to ensure a homogeneous addition. Allow 10 days of contact, then rack. 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).

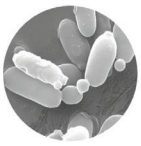
Recommended Dosage

40–80 ppm – 4–8 g/hL – 0.33–0.67 lb/1000 gal – 9–18 g/60 gallon barrel

Note: This product contains ingredient(s) currently listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information please visit TTB.gov.

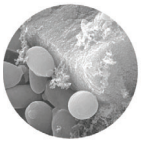
100 g – $111.10 – #16410

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 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.

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
- Start to dissolve upon addition, releasing a precise dose of total SO_2 (free SO_2 will increase based on conditions)
- Perfect for SO_2 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 – $11.90 – #15780 400 g – $23.80 – #15781

Note: Volume discounts are available. Please contact us for details.

INODOSE TABLETS

Effervescent sulfur dioxide tablets

INODOSE TABLETS are ideal for adjusting SO_2 levels in barrels and small tanks. They are pre-measured into convenient package sizes (2 g and 5 g) to make SO_2 additions easier and safer.

- Blend of potassium metabisulfite and potassium bicarbonate
- Start to dissolve upon addition, releasing a precise dose of total SO_2 (free SO_2 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) – $38.90 – #15775 5 g (42/box) – $43.20 – #15776

Note: Volume discounts are available. Please contact us for details.

INODOSE GRANULES AND 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.
- Add directly into barrels after malolactic fermentation.
- To make SO_2 additions to wine during aging.

Storage for Granules and Tablets: Store in a dry, well-ventilated environment at temperatures below 25°C (77°F). Once the pack has been opened it should be used immediately.

INODOSE GRANULES and TABLETS Conversion Chart (ppm Total SO2)

SO_2 Dose	1 Liter	1 Gallon	60 Gallons	100 Gallons	1000 Gallons
2 g	2,000	529	9	5	0.5
5 g	5,000	1,321	22	13	1.3
100 g	100,000	26,420	440	264	26.4
400 g	400,000	105,680	1,761	1,057	106

Note: The tablet sizes (2g and 5g) describe the Total SO2 dose in each tablet, not the total weight of each tablet. The total weight of each tablet will be more than 2 or 5g due to the weight of the other ingredient, potassium bicarbonate.

POTASSIUM METABISULFITE

Potassium metabisulfite can be used throughout the winemaking process from grape receipt to finished wine.

1 kg – $7.60 – #POTMETA1K

TARTARIC ACID

Used to correct tartaric acid deficiencies, to decrease pH, and/or increase the titratable acidity of grapes, juice, and wine, thereby enhancing microbial stability, wine color, and flavor.

5 kg – $114.00 – #TARTARIC5

CLEANING

BENEFITS OF AIRD® PRODUCTS ∞AIRD

- Specially formulated products for the wine industry
- Significant water savings — no citric rinse is required
- Non-dusting product
- Innovative BUILT FORMULA for more effective cleaning
- Effective at low doses over wide temperature ranges
- Does not require hazardous shipping
- No chlorine, other halogens, phosphates, silicates or fillers
- Safer and lower environmental impact than bulk chemical cleaners

WATER SAVINGS WITH AIRD PRODUCTS

AiRD Process **vs** **Classical Method**

Due to its unique formulation, AiRD products can result in up to **50% water savings.***

AiRD Process	Water Used*
Rinse	100 gallons
AiRD Product	200 gallons
Short Rinse	100 gallons
TOTAL	**400 gallons**

Classical Method	Water Used*
Rinse	100 gallons
Caustic	200 gallons
Long Rinse	200 gallons
Citric	200 gallons
Rinse	100 gallons
TOTAL	**800 gallons**

The chart shows a common cleaning procedure for a 2,000 gallon tank cleaning.
*Not including potential reuse of AiRD solutions. Actual water savings may be greater.

CLEANSKIN-K

AIRD

Multi-purpose cleaner and tartrate remover

CLEANSKIN-K can be used on general winery equipment to remove dirt and tartrates while saving time and water.

- Potassium carbonate-based formulation that uses the power of oxygen to effectively clean stainless steel and associated materials
- It is effective at removing tartrates, wine color, protein, and organic soils
- Can be used in tanks, presses, destemmers, and juice channels
- 100% active cleaning product that contains active cleaning agent and proprietary percarbonates, chelation and sequestering aids, polysurfactants, and a rinse aid
- Works well over a wide temperature range (20-60°C/68-140°F)
- Requires no neutralizing rinse - Drain and remove from the system with a single-pass clean water rinse

Storage: Store in a dry, odor-free environment between 10–20°C (50–68°F) away from sunlight.

Recommended Dosage 1.0–4.0% w/v – 10–40 g/L – 1.3–5.4 oz/gal

5 kg – $47.80 – #18500

DESTAINEX-LF

(LOW FOAMING)

AIRD

Multi-purpose oxidizing cleaner for organic soils and biofilms

DESTAINEX-LF is used at low levels to remove wine color, protein stains, mold, mildew, and biofilms from wine contact surfaces.

- Proprietary sodium percarbonate-based cleaning agent with microbial neutralizing abilities
- Can be used on stainless steel, galvanized metals, concrete, polyethylene (low and high density), polypropylene, plastics, flexible hoses, glass, and powder-coated surfaces.
- Can be used in both automated (CIP) and manual systems
- 100% active cleaning product contains sodium percarbonate complemented with proprietary surfactants and chelation agents, water conditioning materials, and rinse aids
- Works well over a wide temperature range (40-60°C/104-140°F)
- Requires no neutralizing rinse - Drain and remove from the system with a single-pass clean water rinse

Storage: Store in a dry, odor-free environment between 10–20°C (50–68°F) away from sunlight.

Recommended Dosage 0.5–1.5% w/v – 5–15 g/L – 0.7–2.0 oz/gal

5 kg – $45.60 – #18504

OAK RESTORER

AIRD

Oak cleaner and refresher

OAK RESTORER is a proprietary cleaner formulated for use on oak surfaces.

- Buffered carbonate cleaner that also contains bicarbonates and surfactants to effectively remove tartrate build-up, color, tannin, and protein residues
- Extends the working life of barrels, puncheons, redwood tanks, and staves
- Single process cleaning agents requiring only a water rinse
- No subsequent neutralization is required
- Leaves wooden surfaces refreshed, odorless and pH neutral

Storage: Store in a dry, odor-free environment between 10–20°C (50–68°F) away from sunlight.

Recommended Dosage 0.5–2.0% w/v – 5–20 g/L – 0.7–2.7 oz/gal

5 kg – $42.20 – #18508

FRUIT WINES & MEAD

CHOOSING PRODUCTS FOR FRUIT WINES AND MEAD

- Highly Recommended
- Recommended

Yeast	Fruit	Mead	Pg#
LALVIN 71B™	●		20
CVW5™	●	●	25
LALVIN DV10™	●	●	25
LALVIN EC1118™	●	●	25
LALVIN ICV D47™	●		27
K1 (V1116)™	●	●	30
LALVIN ICV OKAY™	●		28
LALVIN QA23™	●	●	32
LALVIN R2™	●		32
LALVIN SENSY™	●		34
VIN 13	●	●	35

Nutrients			
GO-FERM PROTECT EVOLUTION™	●	●	50
FERMAID K™	●	●	54
FERMAID O™	●	●	51

Malolactic Bacteria			
LALVIN (MBR) 31™	●		57
O-MEGA™	●		68
SOLO SELECT™	●		69

Enzymes			
SCOTTZYME® HC	●		99
SCOTTZYME® KS	●		100
SCOTTZYME® SPECTRUM	●		101
SCOTTZYME® PEC5L	●		100

Tannins	Fruit	Mead	Pg#
SCOTT'TAN™ FT BLANC	●		83
SCOTT'TAN™FT BLANC CITRUS	●	●	84
SCOTT'TAN™FT BLANC SOFT	●	●	84
SCOTT'TAN™FT COLORMAX	●		84
SCOTT'TAN™FT ROUGE	●		85
SCOTT'TAN™FT ROUGE BERRY	●		85
SCOTT'TAN™FT ROUGE SOFT	●		85
SCOTT'TAN™ RADIANCE	●		86

Fining/Stability Agents			
BENTOLACT S	●		110
CASÉINATE DE POTASSIUM	●		110
COLLE PERLE	●		114
CRISTALLINE PLUS	●	●	115
FRESHPROTECT	●	○	110
FERMOBENT	●		109
FLASHGUM R LIQUIDE	●	●	116
GELOCOLLE	●	●	115
INOCOLLE	●		114
NACALIT	●		109
POLYCACEL	●		111

Yeast Derivative Nutrients			
GLUTASTAR™	●	●	54
ICV NOBLESSE™	●	●	55
OPTI-MUM RED™	●		56
OPTI-RED™	●		56
OPTI-WHITE™	●	●	56
REDULESS™	●	●	57

Making wine from sources other than grapes can be quite a different process and can pose many challenges. However, numerous tools used in grape fermentation can also be utilized in fruit or mead fermentations.

These tools can help the winemaker create a better product and ultimately enhance product longevity. The following information has been compiled to highlight our recommendations.

SELECTING PRODUCTS FOR SUCCESS IN FRUIT WINES & MEAD

YEAST

Using a selected yeast strain can maximize the positive attributes that come with that strain (e.g. mouthfeel, complexity, aromas, fermentation kinetics), while avoiding unpleasant aromas and poor fermentation kinetics that may come with a "wild" strain. The key to yeast choice is matching it to the wine style, and more importantly, the fermentation conditions. Proper rehydration and acclimatization of the selected yeast strain is essential.

NUTRIENTS

Fruit wines and mead are notorious for having low nutrient content. Proper nutrition for both yeast and malolactic bacteria is essential to ensure good fermentation kinetics, with positive flavor and aroma profiles. Nutrients can also help to avoid stuck or prolonged fermentations and H_2S and VA problems.

YEAST DERIVATIVE NUTRIENTS

GLUTASTAR™ and OPTI-WHITE™ are used either pre-fermentation or early in the fermentation to increase mouthfeel, help avoid browning and protect freshness and aromas during aging. OPTI-RED™ and OPTI-MUM RED™ are high in polyphenol reactive polysaccharides. Add at the onset of fermentation to enhance mouthfeel and to help stabilize color. NOBLESSE™ can be used to improve the perception of fruit and roundness and softness in the finish. It may be added at the onset or near the end of fermentation.

MALOLACTIC BACTERIA

Malolactic fermentation can soften wines made from fruit high in malic acid. Many fruits have unbalanced acid profiles and the resulting wine may have a very low pH. Be sure to choose a bacteria strain that works under the conditions of the fruit. If the winemaker's goal is to reduce acid without adding flavor/aroma characteristics, then a neutral strain should be used. Other strains can produce subtle changes in flavor and/or texture.

TANNINS

Tannins help give wine its structure and contribute to its longevity. Honey and some types of fruit contain very little natural tannin.Enological tannins can be used to add structure and enhance flavor and aroma. They reduce the risk of oxidation and help stabilize wine color. 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™ FT COLORMAX, which is most effective when used in conjunction with SCOTT'TAN™ FT ROUGE or FT ROUGE SOFT. SCOTT'TAN™ ONYX, RADIANCE, and ROYAL are ideal tannins for a finishing touch, even just before bottling.

ENZYMES

All fresh fruit contains pectin. For many fruits, excess pectin can be responsible for inadequate juice extraction, lack of clarity, slow sedimentation and poor filterability. Pectinases break down pectin. When pectinases are used at pressing, they result in the release of more juice. At the juice stage, enzymes speed settling of solids prior to racking and fermentation. In finished wine, pectinases aid filterability and final clarification. For most fruit wines, a combination of 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 SCOTTZYME® BG and 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. QI'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. CASÉINATE DE POTASSIUM (casein) and POLYCEL (PVPP) are effective at removing the bitterness and browning caused by oxidation of young wines. REDULESS™ is used to treat wines suffering from reduced sulfur compounds (e.g. H_2S). For fruit wines subject to protein instability, bentonite fining is the only way to remove the unstable proteins.

MICROBIAL CONTROL

Sulfur dioxide (SO_2), Lysozyme, BACTILESS™ and NO BRETT INSIDE™ can all be used to protect wine quality against microbial spoilage. Although its primary use is microbial control, SO_2 also helps reduce the risk of oxidation. Inodose SO_2 Granules and Tablets are pre-measured, and no mixing is necessary once added to the wine. No Brett Inside specifically targets and kills *Brettanomyces*. Lysozyme attacks gram-positive bacteria, such as Lactobacillus, Pediococcus and Oenococcus. BACTILESS™ kills a wider range of bacteria, from lactic acid bacteria to acetic acid bacteria. Both BACTILESS™and 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

INTERNET CONVERSION PROGRAMS

wineadds.com	winebusiness.com/tools

TEMPERATURE CONVERSIONS

F° = Degree Fahrenheit C° → F° = (C° x 9/5) + 32	F°	0	32	40	50	60	70	80	90	100	110	120
C° = Degree Celsius F° → C° = (F° - 32) x (5/9)	C°	-18	0	4	10	16	21	27	32	38	44	49

OTHER CONVERSIONS

1 lb/1000 gal = 454 g/1000 gal = 0.454 kg/1000 gal = 120 mg/L = 27.2 g/barrel* = 0.120 g/L

1 kg/hL = 1000 g/hL = 10,000 mg/L = 2.271 kg/barrel* = 10 g/L

1 ppm = 1 mg/L

*barrel = 60 gal = 227.1 L

1°Brix = 1% sugar (wt/vol)

Standard barrel size is 60 gallons. 59 and 70 gallon barrels are also common and sometimes the three are not visually distinct in size.

FOR OUR BENCH TRIAL PROTOCOL SEE PG 90

HOW TO ORDER

scottlab.com

Our easy-to-use website makes planning and submitting your orders easier than ever. Try one, or all, of these convenient features:

Quick-Order Shopping Cart

Our website's shopping cart allows you to quickly enter orders without navigating to every item page. Simply open the site directly to scottlab.com/shop/basket and start entering search terms or item numbers.

PDF Order FORM

Use order planner at scottlab.com/order-planner to easily plan and organize your winemaking products list in one place.

Reorder

Head to the My Account section (scottlab.com/profile) of the site and you can search back through your past Invoices and Shipments. If you have an order that you want to re-create, click the handy "Reorder" button to load the items from that invoice or shipment into your shopping cart.

Order Templates

If you have groups of items that you order regularly or want to save for quick re-ordering, nothing beats our Order Templates feature. Just assemble a shopping cart by browsing the site or using any of the handy tools listed above, and from the Shopping Cart page choose "Save as Order Template." Next time you want to start an order from this list of items you can load it from either your "My Account" section of the site, or directly from the Shopping Cart page. Great for recurring purchases.

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