SCOTT
LABORATORIES

2024 WINEMAKING HANDBOOK

Premium Winemaking Products

WELCOME

You have a friend at Scott Labs

Welcome to the 2024 edition of the Scott Laboratories Winemaking Handbook! On the heels of what is shaping up to be a wonderful vintage in many U.S. growing regions, we enjoyed chatting with so many of you who are doing such interesting and exciting things.

In recent years, we've seen that the changing wine market has wineries getting creative when it comes to grape varietals, winemaking styles, and practices. We've seen a rise in fruit-forward and approachable reds, as well as fresh but intensely aromatic whites. We've noticed an increase in premium wines going into alternative packaging including cans, kegs, and even bag-in-box! We've also noticed the trend toward low and no SO_2 winemaking (whether for canning/kegging or for the consumer) and the desire to replace animal-based fining agents.

With all of this, we've focused much of our product development and educational content around helping you:

- Increase and preserve aromas (RUBY™, BIODIVA™, FLAVIA™, SAUVY™, FINAL TOUCH TONIC™)
- Control oxidative and microbial damage without SO_2 (INITIA™, GAIA™, GLUTASTAR™, PURE-LEES LONGEVITY™)
- Find options for animal and allergen-free fining (QI'UP XC™, NO[OX]™)

At Scott Laboratories, we take pride in helping you do you what you do best, make great wine.

Something we heard a lot this past harvest was "GO-FERM STEROL FLASH™ changed my life!" Nothing has made us happier than all of your enthusiastic feedback. We think it's pretty cool (pun intended) and we're glad you do too.

For those of you who tried GO-FERM STEROL FLASH™, thank you for the trust you placed in us, our science, and our product development. This process was a huge departure from conventional wisdom, the conventional wisdom WE have been sharing for over 20 years about yeast rehydration and acclimatization. We can't thank you enough for the bold step you took alongside us and it's a privilege to see our innovations making a real difference in your winemaking process.

We are so grateful for your continued trust and support throughout the years. Here's to another year of successful collaborations, innovations, and exceptional winemaking. Together, let's toast to a future filled with outstanding wines and enduring partnerships.

Nichola Hall

Dr. Nichola Hall

General Manager - Fermentation and Enology

SUPPLIERS

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

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

LALLEMAND, our parent company, is a privately owned, Canadian company founded in the 19th century that develops, produces and markets specific yeast, bacteria and derivatives of microorganisms for agricultural, health, pharmaceutical, fermented beverages, and feed & food industries. Drawing on proven experience, Lallemand Oenology offers natural solutions to improve wine quality and help to define wine styles.

THE INSTITUT OENOLOGIQUE DE CHAMPAGNE (IOC) headquartered in Epernay, France can trace its origins back to the founding of the Entrepôt Général de la Champagne in 1890. Since 2010, Scott Laboratories has supplied their products to North America.

Today they offer yeast, fining agents, colloidal stability products, and other wine processing aids for still and sparkling wines.

ANCHOR YEAST began in 1923 when Daniel Mills and Sons started the first yeast plant in Cape Town, South Africa.

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

OENOBRANDS comes to us with a distinguished pedigree of providing winemakers with innovative and scientifically sound solutions. This results in revolutionary products from brands including RAPIDASE® enzymes, FINAL TOUCH® liquid mannoproteins, and CLARISTAR® the potassium tartrate stability agent.

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

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

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

VINEYARD
YEAST
NUTRIENTS
ML FERMENTATION
TANNINS & OAK
ENZYMES
FINING & STABILITY
MICRO CONTROL
FRUIT & MEAD

CONTENTS

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

Please Note: *Trade of wine between the United States, Canada and other nations and/or trade blocs (such as the European Community) may involve restrictions. In particular, these may involve proscription or limitation on the allowable levels of certain ingredients in fermentation aids, fining agents, or stabilization products. To the best of our knowledge, all products described in this handbook when used as directed herein are legal for use in wine made and sold in the United States. Conditions of trade with other nations and trade blocs are subject to ongoing change beyond the control of Scott Laboratories, Inc. It is the responsibility of users of our products to be informed of current restrictions of other countries or trade blocs to which they wish export and to use only products and product levels which conform to those restrictions.*

Published January 2024

SCOTT LABORATORIES

NEW PRODUCTS FOR 2024

Yeast

RUBY™

For the optimal expression of thiols, aromatic complexity, and freshness in red wines

RUBY™ is an innovative new yeast with specific metabolic capabilities that can help reveal thiols in red varieties. RUBY enhances aromas of red fruit (raspberry and cherry), black fruit (blackcurrant and plum), and spice.

Ideal for Syrah, Cabernet Sauvignon, and Grenache.

LALLEMAND

Nutrients

GO-FERM STEROL FLASH™

Rehydration nutrient for use with cool water

GO-FERM STEROL FLASH™ is a revolutionary new yeast rehydration nutrient that can be used with cool water, significantly shortening the rehydration process. Rehydrated yeast can be directly added to juice/must after 15 minutes.

Ideal for saving time, labor, and water.

LALLEMAND

Enzymes

RAPIDASE EXTRA PRESS™

Skin contact enzyme for aroma release, juice extraction, and clarification

RAPIDASE EXTRA PRESS™ efficiently breaks down grape skins and pulp to increase extraction of aromatic precursors and increase juice yields. This enzyme allows for softer and shorter pressing cycles, and makes post-pressing clarification more efficient.

Ideal for aromatic whites.

RAPIDASE

Fining & Stability

FINAL TOUCH POP™

Stabilizes bubbles, colloids, and aromas in sparkling wines

FINAL TOUCH POP™ is a special preparation of liquid mannoproteins that contributes to colloidal stability and wine quality. Other reported benefits include improved aromatic freshness and heightened minerality.

Ideal for sparkling wines but also can be used in still wines.

OENOBRANDS

RECENT NEW PRODUCTS
(IN CASE YOU MISSED THEM FROM 2022-2023)

Yeast	***1895C™*** LALLEMAND The sleeping beauty yeast for clean, crisp wines
	LALVIN NBC™ LALLEMAND Burgundy selection for modern and fresh aromatic whites and rosés
	LEVEL² INITIA™ LALLEMAND Controls juice spoilage organisms while protecting aromas and color from oxidative damage
Nutrients	***STIMULA PINOT NOIR™*** LALLEMAND YAN source that elevates Pinot noir characteristics
Tannins	***ESSENTIAL ANTIOXIDANT™*** IOC Tannin for superior oxidation protection
Fining & Stability	***PURE-LEES DELICACY™*** LALLEMAND Gently softens harsh tannins, increases fruit intensity, and confers colloidal stability
	PURE-LEES ELEGANCY™ LALLEMAND Removes harsh tannin to increase roundness and confers colloidal stability
	FINAL TOUCH TONIC™ OENOBRANDS Protects aroma compounds, helps extend shelf-life, and can contribute to colloidal stability in whites and rosés
	FINAL TOUCH GUSTO™ OENOBRANDS Improves roundness and smoothness and can contribute to colloidal stability in red wines

OMRI LISTED PRODUCTS

While many of our products are compatible with organic wine production, the following products have been OMRI-listed.

Vineyard
LALVIGNE AROMA™ LalVigne
LALVIGNE MATURE™ LalVigne
Rehydration Nutrients
GO-FERM® LALLEMAND
GO-FERM PROTECT EVOLUTION™ LALLEMAND
GO-FERM STEROL FLASH™ LALLEMAND
Fermentation Nutrients
FERMAID O™ LALLEMAND
Yeast Derivatives Nutrients
GLUTASTAR® LALLEMAND
NOBLESSE™ LALLEMAND
OPTI-MUM RED™ LALLEMAND
OPTI-RED™ LALLEMAND
OPTI-WHITE™ LALLEMAND
REDULESS™ LALLEMAND
Malolactic Fermentation Nutrients
ML RED BOOST™ LALLEMAND
OPTI'MALO BLANC™ LALLEMAND

MAKING FRUIT-FORWARD RED WINES?

NON-*SACCHAROMYCES* YEAST

While not primary fermenters, non-*Saccharomyces* yeasts possess unique metabolic properties with interesting winemaking applications, including the ability to boost fruity aromas!

LEVEL² BIODIVA™ has the ability to produce high levels of esters (compounds that increase fruitiness in red wines).

SACCHAROMYCES YEAST

Beyond converting sugars to alcohol, *Saccharomyces* yeasts are key players in enhancing wine aromas through ester production and amplifying varietal aromas.

RUBY™ enhances aromatic complexity and freshness in red wines by revealing thiols.

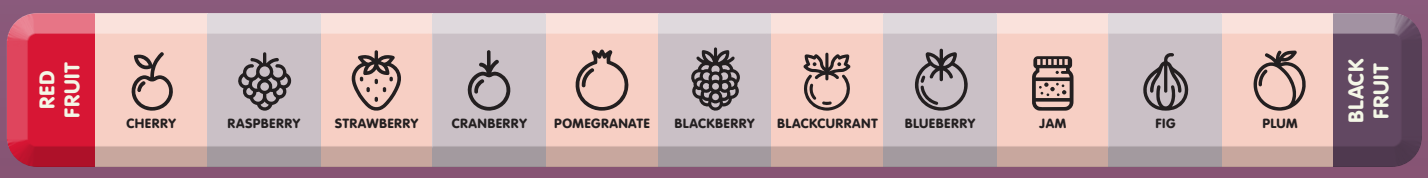
ENZYMES

Certain enological enzymes can efficiently extract anthocyanins for rich color while minimizing extraction of harsh and 'green' tannins. They also facilitate the release of sugar-bound aroma compounds, significantly boosting the wine's fruit-forward profile.

SCOTTZYME COLORPRO™ is a gentle maceration enzyme to help increase tannin profile, color stability, and reduce "veggie" characters in red wines.

RAPIDASE
HIGH SPEED ENZYMES SINCE 1922 REVELATION AROMA

RAPIDASE REVELATION AROMA™ is a pectinase enzyme with alpha and beta-glycosidase side-activities that help release sugar bound terpenes to give red wines intense and complex fruit aromas.



IN RECENT YEARS, WE'VE SEEN A NOTICEABLE SHIFT TOWARDS CRAFTING FRUIT-FORWARD RED WINES. THIS TREND IS FUELED BY CREATIVE INNOVATION, RESPONSES TO CLIMATE CHANGE, AND EVOLVING CONSUMER PREFERENCES. IF YOU'RE LOOKING TO PRODUCE FRUITY REDS, WE OFFER A VARIETY OF TOOLS TO HELP YOU ACHIEVE THAT GOAL.

FERMENTATION NUTRITION

Rehydration nutrients play a key role in aroma production. **GO-FERM PROTECT EVOLUTION™** and **GO-FERM STEROL FLASH™** have been optimized with respect to the quantity and quality of sterols they provide which are important to aroma synthesis.

The **STIMULA™** line of nutrients are the latest generation of advanced fermentation nutrients. They contribute specific vitamins and minerals that stimulate yeast to produce esters and/or produce enzymes that enhance varietal aroma expression.

MALOLACTIC BACTERIA

Not only do malolactic bacteria ensure smooth conversion of malic acid to lactic acid, they can also produce esters and reduce vegetal notes, contributing to a more rounded, fruit-enhanced palate.

PN4™

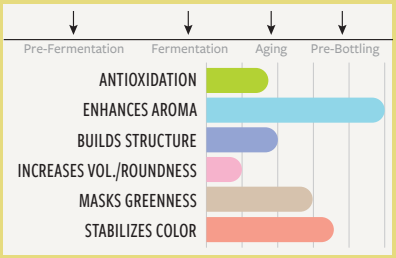
SILKA™

BETA™

TANNINS

Certain tannins are well-suited for making fruit-forward reds due to their ability to preserve and enhance fruit aroma while minimizing greenness.

FT ROUGE BERRY™



THROUGHOUT THE BOOK, LOOK FOR THIS SYMBOL Fruit-Forward Reds TO INDICATE SOME OF OUR FAVORITE PRODUCTS FOR MAKING FRUIT-FORWARD RED WINES!

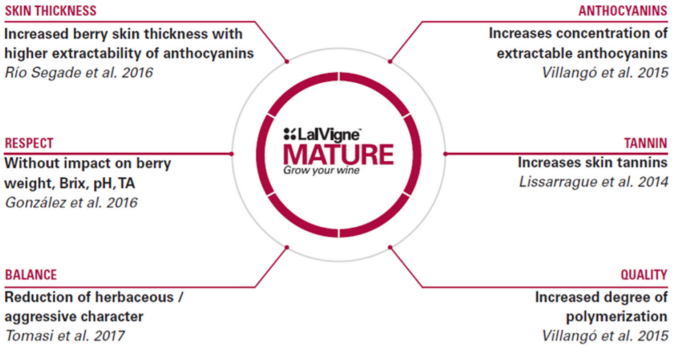
VINEYARD

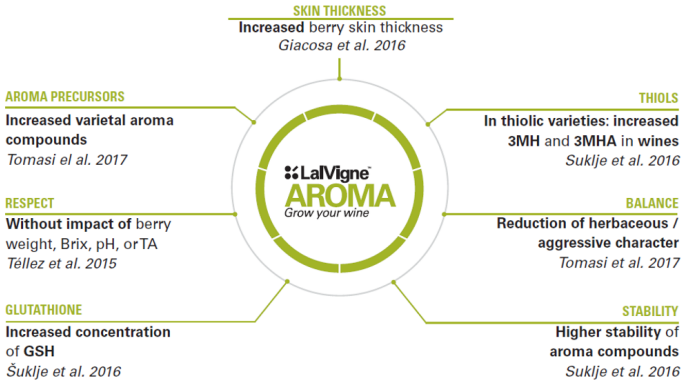
Scott Laboratories is bio-inspired. We love tools that harness the power of microorganisms. LALVIGNE®, by Lallemand Oenology, is a line of wine yeast-based foliar sprays that can elevate your wine starting in the vineyard. Our portfolio of biological solutions based on microorganisms has you covered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

VINEYARD PRODUCTS FOR REGENERATIVE VITICULTURE

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

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





WHAT IS REGENERATIVE VITICULTURE?

Regenerative viticulture is a series of farming practices that helps to minimize the impacts of a changing climate. Regenerative practices avoid synthetic chemicals while focusing on improving top soil health, restoring the soil and plant microbiome, and increasing carbon fixation and water retention. The ultimate goal is to make vineyards more climate resilient while improving grape and wine quality.

LALVIGNE® foliar sprays are natural products that can help improve wine quality. LALVIGNE® can help vineyards become more climate resilient and improve vine function under environmental stresses. LALVIGNE PROHYDRO™ increases the tolerance of grapevines to water and summer stresses and improves the vines ability to recover from stress events. LALVIGNE PROHYDRO™ improves overall vine function, including increased photosynthesis. LALVIGNE MATURE™ and LALVIGNE AROMA™ improve ripening under environmental stress conditions by stimulating the vines secondary metabolic pathways to increase the accumulation of phenolic and aromatic precursors and degrade pyrazines.

These LALVIGNE® products (used independently or combined) can create more balanced wines and reduce undesired traits like green flavors and underripe tannins. Earlier aromatic and phenolic ripeness can mean an earlier ripening window and increased harvest date flexibility. These tools are compatible with organic and regenerative farming practices.

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

VINEYARD PRODUCTS

NEW

LALVIGNE PROHYDRO

LalVigne

Yeast-based foliar spray to improve vine tolerance to water stress

All grape varieties

1 kg – Item #17517

LALVIGNE PROHYDRO™ improves vine adaptation and resistance to excessive water deficit and will increase its recovery after periods of water stress.

- Can help to increase yield
- Can help to minimize berry sunburn and dehydration
- Increased physiological activity of the vine

Recommended Dosage

1 treatment = 1+ applications
(apply prior to onset of stress)

1 application = 1.1 lb/acre (500 g per acre)

LALVIGNE AROMA

LalVigne OMRI

Yeast-based foliar spray for enhancing varietal expression; OMRI listed

White grape varieties

3 kg – Item #17501

LALVIGNE AROMA™ can improve wine quality by encouraging the vine to accumulate more varietal aromas and flavors in the grapes, especially in challenging conditions.

- Increases 3MH aromatic precursors which can convert to 3MHA (tropical and citrus)
- Reduces green and underripe flavors
- Can increase glutathione which helps protect aromatic compounds from degrading and makes them more stable for aging
- Minimal impact on berry weight, °Brix, pH or TA

Recommended Dosage

1 treatment = 2 applications

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

LALVIGNE MATURE

LalVigne OMRI

Yeast-based foliar spray for phenolic maturity and uniform ripening; OMRI listed

Red grape varieties

1 kg – Item #17511

LALVIGNE MATURE™ promotes phenolic maturity and uniform ripening of grapes, especially in challenging conditions.

- Allows for an earlier and larger window of opportunity for harvesting due to advanced phenolics, tannin ripeness
- Reduces green and underripe flavors
- Can increase skin thickness which promotes anthocyanin extractability, improved tannin texture, and tannin polymerization
- Minimal impact on berry weight, °Brix, pH or TA

Recommended Dosage

1 treatment = 2 applications

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

HOW LALVIGNE WORKS

For more information about how LALVIGNE works and for application timing please visit scottlab.com.

For details about whether a specific product is registered in your state please visit scottlab.com. State registrations for our products can change rapidly, and our website serves as the most reliable resource for up-to-date information.

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.

This is due to the fact that 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 (PROHYDRO) and stimulating the metabolic pathways that increase accumulation of phenolics (MATURE) and aromatic precursors (AROMA). At the same time, they also activate the secondary metabolism of the vine that is correlated with increased pyrazine degradation (MATURE and AROMA) (Suklje et al., 2016).

LalVigne™ PROHYDRO
Grow your wine

LALVIGNE PROHYDRO™
to increase vine tolerance to water stress

Scott Laboratories is excited to introduce LALVIGNE PROHYDRO™ to the U.S. in 2024! PROHYDRO naturally increases the 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 and AROMA to improve the vine's **secondary metabolism** responsible for physiological/phenolic ripening.

LalVigne™ MATURE
Grow your wine

LalVigne™ AROMA
Grow your wine

LALVIGNE MATURE & AROMA
to improve physiological/phenolic ripening

LALVIGNE MATURE and LALVIGNE AROMA 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.**

Keller, M. (2020). The Science of Grapevines (Third Edition). Academic Press. https://doi.org/10.1016/B978-0-12-816365-8.09989-9

Šuklje, K., Antalick, G., Buica, A., Coetzee, Z. A., Brand, J., Schmidtke, L. M., & Vivier, M. A. (2016). Inactive dry yeast application on grapes modify Sauvignon Blanc wine aroma. Food Chemistry, 197, 1073-1084. https://doi.org/10.1016/j.foodchem.2015.11.105

*Please see scottlab.com for current pricing. For a complete price list of all items in this book, see scottlab.com/order-planner.

YEAST

Celebrating 90+ Years of Yeast Production

Scott Labs loves yeast! We were founded as a yeast company in 1933 and were instrumental in bringing active dried wine yeast strains 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 Labs 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 Labs, our mission is to provide robust and reliable yeast strains that optimize quality, aromas, and flavors.

SELECTING YEAST FOR SUCCESS

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

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

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

STEP 2: Compare the sensory impact of compatible yeast strains

AROMA, FLAVOR, AND MOUTHFEEL IMPACT	**Yeast contribute to wine aroma, flavor, and mouthfeel.** They can release aromas from grapes as well as produce aromatic compounds. Certain strains also produce polysaccharides and other compounds increasing mouthfeel. Select yeast with traits best suited for the intended wine style.
AVOIDING HYDROGEN SULFIDE (H_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 LOW H_2S and SO_2 in the yeast descriptions to identify these strains.**

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

See pgs 16-21 for the "Quick Guide to Choosing Yeast."
See pgs 22-41 for detailed descriptions of each yeast.

YEAST STRAINS FOR WHITE & ROSÉ WINE

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

	43/43 RESTART	58W3	71B	1895C	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#	22	23	23	23	24	24	25	25	26	26	27	27	28	28	29	29	29	30	30	30	31	31
S. cerevisiae cerevisiae		O	O	O			O	O		O	O			O							O	O
S. cerevisiae bayanus	O												O		O	O				O		
Yeast hybrid												O					O	O	O			
Yeast blend					O	O			O													
Alcohol Tolerance[1]	17%	14%	14%	15%	15.5%	15.5%	15%	16%	16%	15%	13.5%	15%	15%	15%	17%	18%	15%	15.5%	15.5%	18%	12%	16%
YAN Requirements[2]	Low	Med	Low	Low	Med	Med	Med	High	High	High	Med	Low	Low	High	Low	Low	Med	Med	Med	Med	Med	Med
Temp. Range (°F)[3]	55–95	54–77	59–85	60–89	56–61	56–61	68–86	59–77	64–82	64–88	59–77	58–68	57–82	59–77	50–95	50–86	57–77	64–83	62-82	59–86	61-72	61–86
Fermentation Speed	Fast	Mod	Mod	Mod	Fast	Fast	Slow	Mod	Mod	Fast	Slow	Mod	Fast	Mod	Fast	Fast	Slow	Mod	Mod	Mod	Slow	Mod
Competitive Factor	Pos	Ntrl	Snstv	Ntrl	Pos	Pos	Snstv	Snstv	Pos	Ntrl	Snstv	Pos	Pos	Snstv	Pos	Pos	Snstv	Pos	Pos	Ntrl	Pos	Pos
MLF Compatibility	Very Good	Very Good	Very Good	Avg	Good	Good	Very Good	Good	Below Avg	Avg	NA	Good	Very Good	Good	Good	Avg*	Avg	Very Good	Good	Good	Avg	Good
Sensory Effect	Ntrl	Evc, E, M	E	Evc	Evc, E	Evc	Evc	E, M	Evc, M	Evc, M	E	Evc, M	E	Evc, M	Ntrl	Ntrl	Evc, E	Evc, M	Evc, M, E	Ntrl	E	Evc, M
Fruity (Esters)		♦	♦				♦	♦			♦		♦	♦			♦	♦	♦		♦	♦
Grassy (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 66.*

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

YEAST STRAINS FOR WHITE & ROSÉ WINE

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

	ICV D47	ICV D254	ICV GRE	ICV OKAY	ICV OPALE 2.0	ICV SUNROSE	IOC BE FRUITS	IOC BE THIOLS	K1 (V1116)	MSB	NBC	NT 116	QA23	R2	RHÔNE 4600	R-HST	SAUVY	SENSY	VIN 13	VIN 2000	W15
Pg#	31	32	32	32	33	33	33	33	34	34	35	35	36	37	37	38	39	39	40	40	41
S. cerevisiae cerevisiae	O	O	O			O			O		O				O	O	O				O
S. cerevisiae bayanus										O			O	O							
Yeast hybrid				O	O		O	O				O						O	O	O	
Yeast blend																					
Alcohol Tolerance[1]	15%	16%	15%	16%	14%	16%	14%	15%	18%	14.5%	15%	16%	16%	16%	15%	15%	14%	15%	17%	15.5%	16%
YAN Requirements[2]	Low	Med	Med	Low	Low	Med	Low	Med	Low	Med	Med-High	Med	Low	Med	Low	Med	Med	Low	Low	Low	High
Temp. Range (°F)[3]	60–82	54–82	59–82	54–86	59–86	57-68	54–75	59–77	50–95	57-68	57-68	54-65	59–90	50–86	56–72	50–86	57–68	54–64	54–61	55–61	50–81
Fermentation Speed	Mod	Mod	Mod	Mod	Mod	Mod	Mod	Fast	Fast	Mod	Mod	Fast	Fast	Mod	Mod	Mod	Mod	Mod	Fast	Mod	Mod
Competitive Factor	Pos	Ntrl	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Ntrl	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos
MLF Compatibility	Very Good	Very Good	Very Good	Very Good	Good	Good	Good	Good	Poor	Not Known	Very Good	Good	Very Good	Good	Very Good	Good	Very Good	Very Good	Good	Good	Very Good
Sensory Effect	Evc, M	Evc, M	Evc, M	E	Evc, E	E	E	Evc	E	Evc, M	Evc	Evc, E	Evc	Evc	E	Evc, M	Evc	Evc, M	Evc, E	Evc, E	Evc, M
Fruity (Esters)	♦		♦	♦	♦	♦	♦		♦	♦		♦	♦	♦	♦			♦	♦		♦
Grassy (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
Pos Positive
Ntrl Neutral
Snstv Sensitive
Avg Average

	43	43 RESTART	71B	1895C	3001	ALCHEMY III	ALCHEMY IV	ASSMANSHAUSEN (AMH)	BDX	BM 4X4	BRG	BRL97	CLOS	CSM	CVRP	EXOTICS MOSAIC	EXOTICS NOVELLO	FERMIVIN CHAMPION	FERMIVIN MT48
Pg#	22	22	23	23	23	24	24	25	25	26	26	26	27	27	28	30	30	30	30
S. cerevisiae cerevisiae			○	○	○			○	○		○	○	○	○	○				○
S. cerevisiae bayanus	○	○																○	
Yeast hybrid																○	○		
Yeast blend						○	○			○									
Alcohol Tolerance[1]	17%	17%	14%	15%	15%	15.5%	15.5%	15%	16%	16%	15%	16%	17%	15%	16%	15.5%	15.5%	18%	15%
YAN Requirements[2]	Low	Low	Low	Low	Med	Med	Med	Med	Med	High	High	Med	Med	Med	Med	Med	Med	Med	Low
Temp. Range (°F)[3]	55–95	55–95	59–85	60–89	54–90	61–82	61–82	68–86	64–86	64–82	64–88	62–85	57–90	59–90	64–86	64–83	62–82	59–86	68–86
Fermentation Speed	Fast	Fast	Mod	Mod	Mod	Fast	Fast	Slow	Mod	Mod	Fast	Mod	Fast	Mod	Mod	Mod	Mod	Mod	Mod
Competitive Factor	Pos	Pos	Snstv	Ntrl	Pos	Pos	Pos	Snstv	Snstv	Pos	Ntrl	Pos	Pos	Pos	Pos	Pos	Pos	Ntrl	Ntrl
MLF Compatibility	Very Good	Very Good	Very Good	Avg	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	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 66.*

YEAST STRAINS FOR RED WINE

○ Yeast Strain Type
● Recommended
M Mouthfeel
Evc Enhanced Varietal Character
E Esters
Mod Moderate
Pos Positive
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	RUBY NEW	SYRAH	T73	TANGO	VRB	W15
Pg#	31	31	32	32	32	34	35	35	35	36	37	37	38	38	39	40	40	41	41
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%	16%	15.5%	17%	16%
YAN Requirements[2]	Med	High	Med	Med	Low	Very High	Med	Med	Med	Low	Med	High	Med	Low	Med	Low	Med	Med	High
Temp. Range (°F)[3]	61–86	59–82	54–82	59–82	54–86	77–82	59–90	76-83	64-82	59–82	60–86	59–82	68–86	61-82	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	Fast	Mod	Mod	Mod	Mod	Mod
Competitive Factor	Pos	Pos	Ntrl	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Ntrl	Pos	Pos	Pos	Pos	Pos	Ntrl	Ntrl	Pos
MLF Compatibility	Good	Good	Very Good	Very Good	Very Good	Good	Avg	Good	Very Good	Very Good	Good	Below Avg	Good	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	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

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

	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#	23	23	24	27	28	28	29	30	31	31	33	33	33	35	36	39	40	40
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	Pos	Pos	Pos	Snstv	Snstv	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Pos
MLF Compatibility	Avg	Very Good	Good	Good	Very Good	Good	Avg	Very Good	Avg	Very Good	Good	Good	Good	Good	Very Good	Very Good	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	♦	♦	♦	♦	♦		♦		♦		♦		♦	♦	♦		♦	

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 66.*

AMERICAN AND HYBRID 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 be influenced by the yeast strain. Yeast can enhance flavors,

YEAST STRAINS FOR AMERICAN & HYBRID RED CULTIVARS

◆ Recommended
M Mouthfeel
Evc Enhanced Varietal Character
E Esters
Mod Moderate
Pos Positive
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#	23	23	24	24	26	27	27	28	30	32	32	35	36	37	39	40	41	41
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	Pos	Snstv	Pos	Pos	Pos	Pos	Pos	Pos	Pos	Ntrl	Pos	Pos	Pos	Ntrl	Pos	Pos	Snstv	Pos
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.

AMERICAN AND HYBRID WINES (CONTINUED)

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 characters 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

WHY ARE SPECIALTY YEASTS SPECIAL?

50 YEARS OF INNOVATION

Selected wine yeasts in an active dry form have revolutionized winemaking and our understanding has improved significantly over the last 50 years. Initially, these yeasts ensured dependable alcoholic fermentation, but today, they offer much more.

Today, both *Saccharomyces* and non-*Saccharomyces* yeasts are recognized for their fermentation prowess and for their contribution to a wine's sensory profile – positively impacting aromas, flavors, color, and mouthfeel. Additionally, these yeasts bring technological benefits such as enhanced bioprotection, acidification, and reduced production of volatile acidity and hydrogen sulfide.

Within this section, you will find a series of informative **spotlights**. Each **spotlight** focuses on a different trait, offering insights into what makes these strains unique and the innovations behind them.

43

LALLEMAND YSEO

Fructophilic yeast for high-sugar fermentations

Alcohol Tolerance: 17%

Nitrogen Needs: LOW

Temp. Range: 13-35°C (55-95°F)

Frequently used in high °Brix musts, Zinfandel, Syrah

500 g – #15134
10 kg – #15140

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

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

43 RESTART

LALLEMAND YSEO

Pre-acclimated fructophilic yeast for restarting stuck fermentations

Alcohol Tolerance: 17%

Nitrogen Needs: LOW

Temp. Range: 13-35°C (55-95°F)

Frequently used in restarting stuck fermentations

500 g – #15223
10 kg – #15240

UVAFERM 43 RESTART™ is an optimized and pre-acclimated UVAFERM 43 that can efficiently restart a stuck alcoholic fermentation.

- Effectively consumes residual fructose and glucose under challenging conditions
- Acclimatization during the production of UVAFERM 43 RESTART results in cells that are robust, adapt quickly, and have a low mortality rate after inoculation
- For best results, use the UVAFERM 43 RESTART protocol for stuck wines (pg 44)
- *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

Why are specialty yeasts special? **THEY CAN HELP RESTART STUCK FERMENTATIONS WHERE OTHER YEASTS FAIL**

Glucose and fructose are the main fermentable sugars in grapes, and at the onset of fermentation, they are present in roughly equal quantities. *Saccharomyces cerevisiae* is a glucophilic yeast and during the course of fermentation will preferentially consume glucose. Near the end of fermentation, this can sometimes result in higher concentrations of fructose than glucose. Under certain stressful conditions (high alcohol, temperature spikes, etc.), *Saccharomyces* yeast may struggle to utilize fructose. This can lead to stuck or sluggish fermentations.

However, different strains of *Saccharomyces cerevisiae* differ in their capacity to consume fructose. Researchers have identified a large, multi-gene family known as HXT which regulates sugar transport genes. Within this family, a certain gene, Hxt3, has been isolated as responsible for determining a yeast's capacity to consume fructose (Guillaume et al., 2007).

UVAFERM 43 is an exceptionally fructophilic strain that possesses the Hxt3 gene. **UVAFERM 43 RESTART** is a version of **UVAFERM 43** that has been specifically pre-acclimated to excel in the challenging environments often encountered in the late stages of fermentation (such as high alcohol, low sugar, and low nutrients). This specialized conditioning makes **UVAFERM 43 RESTART** a robust solution for restarting stuck or sluggish fermentations, offering winemakers a dependable tool for maintaining fermentations under demanding conditions.

Guillaume, C., Delobel, P., Sablayrolles, J. M., & Blondin, B. (2007). Molecular basis of fructose utilization by the wine yeast Saccharomyces cerevisiae*: a mutated HXT3 allele enhances fructose fermentation. Applied and environmental microbiology, 73(8), 2432-2439. https://doi.org/10.1128/AEM.02269-06*

Check out the protocol on pg 44 to learn about how to use UVAFERM 43 RESTART for restarting a stuck fermentation.

58W3

Spicy and fruity aromatic white wines

Alcohol Tolerance: 14%
Nitrogen Needs: MEDIUM
Temp. Range: 12-25°C (54-77°F)

Frequently used in Pinot gris, Riesling, Muscat, Gewürztraminer, aromatic whites, cider

500 g – #15630
10 kg – #15631

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 hydrogen sulfide (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

Fruit-Forward Reds

71B

Enhances fruity characters and degrades malic acid

Alcohol Tolerance: 14%
Nitrogen Needs: LOW
Temp. Range: 15-29°C (59-85°F)

Frequently used in Pinot gris, Riesling, Grenache, rosés, hybrids, fruit-forward reds, cider, grapes with high malic acid

500 g – #15059
10 kg – #15078

LALVIN 71B® is known for fermenting fruity red wines, rosés, and semi-sweet whites with long-lived aromas due to the synthesis of stable esters and higher alcohols.

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

1895C

The sleeping beauty yeast for clean, crisp wines

Alcohol tolerance: 15%
Nitrogen needs: Low
Temp. Range: 16-32°C (60-89°F)

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

500 g – #15655

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

- This strain is suitable for most wine types where clean aromatics and varietal expression are desired
- Steady fermenter with a short lag phase
- Low volume of lees due to smaller cell size
- Low foaming strain with very low production of volatile acidity and hydrogen sulfide (H_2S)
- *Saccharomyces cerevisiae cerevisiae* strain

3001

Burgundy selection for enhanced varietal expression in Pinot noir

Alcohol Tolerance: 15%
Nitrogen Needs: MEDIUM
Temp. Range: 12-32°C (54-90°F)

Frequently used in Pinot noir, Chambourcin

500 g – #15682

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

ALCHEMY I

Intensely fruity and floral white wines

Alcohol Tolerance: 15.5%
Nitrogen Needs: MEDIUM
Temp. Range: 13-16°C (56-61°F)

Frequently used in Sauvignon blanc, Chardonnay, Chenin blanc, Riesling, Pinot gris, Rhône whites, aromatic whites, cider

1 kg – #15174

ALCHEMY I™ focuses on thiol revelation, thiol conversion, and ester production, resulting in intensely fruity wines.

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

ALCHEMY II

Tropical white wines

Alcohol Tolerance: 15.5%
Nitrogen Needs: MEDIUM
Temp. Range: 13-16°C (56-61°F)

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

1 kg – #15177

ALCHEMY II™ enhances 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 *Saccharomyces cerevisiae* wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

ALCHEMY III

Fruity and floral aroma production in bold and high alcohol reds

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

Frequently used in Cabernet Sauvignon, Malbec, Zinfandel, Tempranillo, Grenache, Petit Verdot, structured reds

1 kg – #15230

ALCHEMY III™ is a strong fermenter and is a high fruity and floral aroma producer.

- 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)
- Fast fermenter, produces minimal SO_2 and very low levels of foam
- Blend of *Saccharomyces cerevisiae* wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

Fruit-Forward Reds

ALCHEMY IV

Intense red fruit aroma production for medium-bodied reds

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

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

1 kg – #15231

ALCHEMY IV™ promotes 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
- Fast fermenter, produces minimal SO_2 and high levels of glycerol (8–11 g/L)
- Blend of *Saccharomyces cerevisiae* wine yeast strains
- Developed in collaboration with the Australian Wine Research Institute (AWRI), Australia

ASSMANSHAUSEN (AMH)

LALLEMAND

Allows for the expression of indigenous microflora

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 20-30°C (68-86°F)

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

500 g – #15632
10 kg – #15633

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

- Promotes spicy (clove, nutmeg) and fruit flavors and aromas
- Long lag phase with a slow to medium fermentation rate
- If desired, lag phase can be reduced and fermentation rate increased if AMH is added to 10% of the total juice/must volume for eight hours, then added into full volume
- AMH's long lag phase will allow native yeast and bacteria to deplete juice/must nutrients, so rehydration in GO-FERM PROTECT EVOLUTION™ or GO-FERM STEROL FLASH™ and good fermentation nutrition is highly recommended
- *Saccharomyces cerevisiae cerevisiae* strain (reclassified from *S. kudriavzevii* in 2021)
- Originating from the Geisenheim Research Institute, Germany

BA11

LALLEMAND YSEO

Strong fermenter for aromatic complexity and mouthfeel

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 15-25°C (59-77°F)

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

500 g – #15117

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

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

BDX

LALLEMAND YSEO

Steady fermenter for enhanced varietal character in Bordeaux reds

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 18-30°C (64-86°F)

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

500 g – #15634
10 kg – #15635

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

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

BM 4X4

Aromatic complexity and mouthfeel in reds and whites

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 18-28°C (64-82°F)

Frequently used in Sangiovese, Cabernet Sauvignon, Grenache, Zinfandel, Chardonnay, Italian reds

500 g – #15176
10 kg – #15200

LALVIN BM 4X4™ is a scientifically formulated blend of two yeast strains: one known for aromatic complexity (LALVIN BM45™) and another for fermentation reliability.

- 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 and sensory descriptors include jam, cherry liqueur, sweet spice, licorice, cedar, floral, and earthy
- Can mask green characters (methoxypyrazines)
- Has elevated nutrient needs and can produce a high level of SO_2 and therefore is not considered MLF friendly. Not recommended for co-inoculation. Ensure adequate nutrients are supplied when used in sequential inoculation.
- Blend of *Saccharomyces cerevisiae cerevisiae* strains
- Selected by the Consorzio del Vino Brunello de Montalcino and the University of Siena, Italy

Why are specialty yeasts special? **THEY CAN IMPROVE ROUNDNESS AND STABILIZE COLOR**

Yeast cell walls contain certain polysaccharides including mannoproteins and glucans which are released into wine when yeast cells die and autolyze (break open). These polysaccharides can complex with tannins (reducing astringency) and anthocyanins (helping to stabilize color). They can also add texture and roundness.

Yeast strains vary in what polysaccharides their cell walls contain, how reactive those polysaccharides are, and how quickly their cells autolyze, all of which determines how well a given strain can impact texture and color. For example, **BM 4x4** has naturally reactive polysaccharides that complex well with tannins and anthocyanins. **CY3079** quickly autolyzes at the end of fermentation, which can contribute roundness akin to "sur lie" aging.

Check the yeast choosing charts on pages 16-21 and look for those marked for mouthfeel (M) for other strains that can improve roundness.

BRG

Classic strain for Burgundy varietals

Alcohol Tolerance: 15%

Nitrogen Needs: HIGH

Temp. Range: 18-31°C (64-88°F)

Frequently used in Chardonnay, Pinot blanc, Pinot noir

500 g – #15669
10 kg – #15670

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

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

BRL97

Enhanced color stability and structure in color-sensitive wines

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 17-29°C (62-85°F)

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

500 g – #15102
10 kg – #15205

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

CEG (EPERNAY II)

Sweet and semi-sweet wine production

Alcohol Tolerance: 13.5%

Nitrogen Needs: MEDIUM

Temp. Range: 15-25°C (59-77°F)

Frequently used in rosés, whites

500 g – #15081
10 kg – #15093

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

Fruit-Forward Reds

CLOS

Aromatic complexity and mouthfeel in big reds

Alcohol Tolerance: 17%

Nitrogen Needs: MEDIUM

Temp. Range: 14-32°C (57-90°F)

Frequently used in Cabernet Sauvignon, Syrah, Grenache, Tempranillo, Zinfandel, Petite Sirah, Barbera, Petit Verdot, Malbec, structured reds

500 g – #15201
10 kg – #15204

LALVIN CLOS™ was selected for its ability to enhance aromatic complexity, structure, and mouthfeel in full-bodied red wines.

- Wines display nice berry aromas and have good tannin intensity, full mid-palate, and ageable tannins
- Good implantation rates, but can be slow to start fermentation in cold must which makes for a simulated "cold soak"
- Reliable fermenter and low H_2S, SO_2, and VA producer
- *Saccharomyces cerevisiae cerevisiae* strain
- Isolated by the University of Rovira i Virgili in Spain from the Priorat region

CROSS EVOLUTION

Strong fermenter for round, rich, aromatic whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 13-20°C (58-68°F)

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

500 g – #15640
10 kg – #15641

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 and complex mouthfeel
- Strong fermenter even under challenging conditions of high potential alcohol and low YAN
- *Saccharomyces cerevisiae cerevisiae* hybrid
- From the Institute for Wine Biotechnology at the University of Stellenbosch, South Africa

CSM

Minimizes greenness and combats color instability in underripe fruit

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 15-32°C (59-90°F)

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

500 g – #15638
10 kg – #15639

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 hydrogen sulfide (H_2S) if vitamins and/or nitrogen is deficient (see page 66 for assistance crafting a nutrition plan)
- *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)

CVRP

Produces rich red wines with round mouthfeel and smooth tannins

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 18-30°C (64-86°F)

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

500 g – #15207
10 kg – #15208

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)

CVW5

Fresh and fruity white and rosé wines under difficult fermentation conditions

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 14-27°C (57-82°F)

Frequently used in Chardonnay, Chenin blanc, Pinot gris, rosés, Albariño, Muscat, aromatic whites, fruit wines, cider

500g – #15237
10 kg – #15210

CVW5™ is a high producer of fruity aromas (esters) and a low producer of volatile acidity (VA) 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 close relative of LALVIN EC1118™ (pg 29)
- Must be stored at 39-52°F (4-11°C)

Why are specialty yeasts special? **THEY CAN PRODUCE FRUITY AND FLORAL AROMAS DURING FERMENTATION**

Esters and higher alcohols are fruity and floral aroma compounds often characterized as pineapple, rose, banana, melon, and apple. *Saccharomyces* yeasts generate these compounds as metabolic byproducts of the fermentation of grape sugars into alcohol.

LALVIN 71B™ was one of the first yeast that was characterized for its ester production but now all strains are screened for their ester producing abilities. This led to the selection of **CVW5**, one of the highest ester producers in our portfolio!

Check the yeast choosing charts on pages 16-21 to look for other ester producing strains.

CY3079

Classic strain for barrel-fermented Burgundy whites

Alcohol Tolerance: 15%

Nitrogen Needs: HIGH

Temp. Range: 15-25°C (59-77°F)

Frequently used in Chardonnay, Pinot blanc

500 g – #15061
10 kg – #15082

LALVIN CY3079™ is a highly complementary yeast for barrel-fermented and sur-lie aged white wines, especially those made in the classical white Burgundy style.

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

DV10

Strong fermenter for crisp, clean wines

Alcohol Tolerance: 17%

Nitrogen Needs: LOW

Temp. Range: 10-35°C (50-95°F)

Frequently used in Chardonnay, sparkling fermentations, Gewürztraminer, Pinot gris, late harvest, Pinot blanc, fruit wines, cider

500 g – #15062
10 kg – #15106

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 volatile acidity (VA), and very low hydrogen sulfide (H_2S) and SO_2 production
- *Saccharomyces cerevisiae bayanus* strain
- French isolate from an area renowned for making sparkling wine

EC1118 (PRISE DE MOUSSE)

Original sparkling wine strain

Alcohol Tolerance: 18%

Nitrogen Needs: LOW

Temp. Range: 10-30°C (50-86°F)

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

500 g – #15053
10 kg – #15076

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

- Good flocculation characteristics resulting in compact lees
- Under deficient nutrient conditions EC1118 can produce high amounts of 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, France

Why are specialty yeasts special? **THEY CAN RELIABLY FINISH ALCOHOLIC FERMENTATION**

Initially, wine yeasts were selected solely for their ability to complete alcoholic fermentation. Some of the earliest selected wine yeasts (like **LALVIN EC1118™**) were 'work horses' and could reliably finish fermentation even under stressful conditions.

As the science of wine yeast selection advanced, the "competitive factor" was discovered and led to the selection of **LALVIN ICV K1™**. The competitive factor (or killer factor) relates to a yeast strain's ability to outcompete other *Saccharomyces* strains, a trait that was thought to enhance quicker implantation (reaching a population size supportive of fermentation). Since its discovery, all selected wine yeasts are screened for the presence of this trait. However, it is important to note that some wine yeast strains, despite being "competitive factor sensitive", are excellent fermenters and show very good implantation capacities. Nonetheless, this milestone in yeast selection marked the beginning of the era of "specialty" yeasts.

Check the yeast choosing charts on pages 16-21 to determine the competitive factor of your chosen strain (positive, neutral, or sensitive).

ELIXIR

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

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 14-25°C (57-77°F)

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

500 g – #15214

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, hydrogen sulfide (H_2S), and volatile acidity (VA) producer
- *Saccharomyces cerevisiae* hybrid
- From the yeast hybridization program at the Institute for Wine Biotechnology at the University of Stellenbosch, South Africa

EXOTICS MOSAIC

Aromatically intense red and white wines suitable for aging

Alcohol Tolerance: 15.5%
Nitrogen Needs: MEDIUM
Temp. Range: 18-28°C (64-83°F)

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

250 g – #15213
5 kg – #15220

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), once opened use immediately

Fruit-Forward Reds

EXOTICS NOVELLO

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

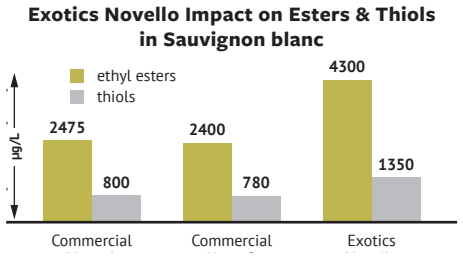
Alcohol Tolerance: 15.5%
Nitrogen Needs: MEDIUM
Temp. Range: 17-27°C (62-82°F)

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

250g – #15271

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
- *Saccharomyces cerevisiae* and *S. cariocanus* hybrid
- Developed by Anchor Oenology in collaboration with the Australian Wine Research Institute (AWRI)
- Must be stored at 5-15°C (41-59°F)



FERMIVIN CHAMPION

Fructophilic yeast for restarting stuck ferments

Alcohol Tolerance: 18%
Nitrogen Needs: MEDIUM
Temp. Range: 15-30°C (59-86°F)

Frequently used in restarting stuck fermentations

500 g – #17143

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.

- Used for restarting stuck or sluggish fermentations when sugar is high and alcohol is relatively low
- 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

Fruit-Forward Reds

FERMIVIN MT48

Fruit-forward and approachable reds

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

Frequently used in Merlot, Sangiovese, Grenache, Tempranillo, Syrah, fruit-forward reds

500 g – #17106

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)

FERMIVIN SM102

Sweet and semi-sweet wine production

Alcohol Tolerance: 12%

Nitrogen Needs: MEDIUM

Temp. Range: 16-22°C (61-72°F)

Frequently used in sweet whites and rosés

500g – #17140

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

- Produces delicate floral aromas and flavors while respecting varietal characteristics
- Easily stopped by alcohol levels above 12% or with chilling to <13 °C (55°F)
- *Saccharomyces cerevisiae cerevisiae* strain
- Isolated from the Cognac region, France

ICV D21

Freshness and mouthfeel for mature and concentrated reds and whites

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 16-30°C (61-86°F)

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

500 g – #15143
10 kg – #15163

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

- Ripe white grapes develop fresh citrus aromas
- Red wines are noted for berry, and red fruit aromas, stable color, intense fore-mouth volume, mid-palate tannin structure, and fresh aftertaste
- Good for use in underripe or overripe fruit. D21 helps to mask herbaceous notes in underripe fruit and cooked, jammy aromas in overripe 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

ICV D47

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

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 16-27°C (60-82°F)

Frequently used in Chardonnay, rosés, Rhône whites, Riesling, cider

500 g – #15642
10 kg – #15643

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

ICV D80

Enhances tannin structure in big reds

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 15-27°C (59-82°F)

Frequently used in Cabernet Sauvignon, Grenache, Merlot, Syrah, Zinfandel, Petite Sirah, structured reds

500 g – #15125
10 kg – #15133

LALVIN ICV D80™ brings out varietal aromas, reinforces rich concentrated flavors, enhances tannin intensity, and helps stabilize color.

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

ICV D254

Mouthfeel, roundness, and balance in reds and whites

Alcohol Tolerance: 16%
Nitrogen Needs: MEDIUM
Temp. Range: 12–27°C (54–82°F)

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

500 g – #15094
10 kg – #15021

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

Fruit-Forward Reds

ICV GRE

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

Alcohol Tolerance: 15%
Nitrogen Needs: MEDIUM
Temp. Range: 15–27°C (59–82°F)

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

500 g – #15101
10 kg – #15142

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
- Reduces vegetal and undesirable sulfur off-odors
- Rapid onset of fermentation
- Low production of SO_2, volatile acidity (VA), and foam
- *Saccharomyces cerevisiae cerevisiae* strain
- Selected by the Institut Coopératif du Vin (ICV) in 1992 from the Cornas area of the Rhône Valley, France

LOW H_2S **and** SO_2

ICV OKAY

Strong fermenter and fruity ester production

Alcohol Tolerance: 16%
Nitrogen Needs: LOW
Temp. Range: 12–30°C (54–86°F)

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

500 g – #15221
10 kg – #15222

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

- Especially suitable for wines that struggle with H_2S and sulfur off-odors
- Very short lag phase, steady fermentation kinetics, and good fermentation security
- Low production of acetaldehyde
- *Saccharomyces 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

LOW H_2S and SO_2

ICV OPALE 2.0

Enhanced varietal character in whites and rosés

Alcohol Tolerance: 14%
Nitrogen Needs: LOW
Temp. Range: 15-30°C (59-86°F)

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

500 g – #15065

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.

- Especially suitable for wines that struggle with H_2S and sulfur off-odors
- White wines are fresh with notes of citrus, tropical fruit, and white flowers
- Rosé wines can display tropical or fresh red fruit character
- On the palate wines have an initial impression of volume and softness, followed by a round mid-palate and balanced finish
- Fast onset of fermentation followed by steady rate
- Low production of acetaldehyde
- *Saccharomyces 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

ICV SUNROSE

Complex and elegant rosé wines

Alcohol Tolerance: 16%
Nitrogen Needs: MEDIUM
Temp. Range: 14-20°C (57-68°F)

Frequently used in rosés from warm climates

500 g – #15280

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

LOW H_2S and SO_2

IOC BE FRUITS

Fruity ester production for cold-fermented whites and rosés

Alcohol Tolerance: 14%
Nitrogen Needs: LOW
Temp. Range: 12-23°C (54-75°F)

Frequently used in Albariño, aromatic whites, rosés, cider

500 g – #15241

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

- Especially suitable for wines that struggle with H_2S and sulfur off-odors
- Low production of acetaldehyde
- 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
- *Saccharomyces cerevisiae cerevisiae* strain
- Selected by the National Research Institute for Agriculture, Food and the Environment (INRAe), France

LOW H_2S and SO_2

IOC BE THIOLS

Enhances varietal character (thiols) in aromatic whites and rosés

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

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

500 g – #15247

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

- Especially suitable for wines that struggle with H_2S and sulfur off-odors
- Enhances grapefruit and passion fruit (3MH) aromas without excessive grassy characters
- Low production of acetaldehyde
- Optimal conditions are: turbidity of 60-100 NTU, pH >3.2, fermentation temperatures of 15–20°C (59–68°F)
- Fast fermenter with a short lag phase
- *Saccharomyces cerevisiae cerevisiae* strain
- Selected by the National Research Institute for Agriculture, Food and the Environment (INRAe), France

IONYS$_{WF}$

Acid production and mouthfeel enhancement for warm climate reds

Alcohol Tolerance: 16%

Nitrogen Needs: VERY HIGH

Temp. Range: 25-27°C (77-82°F)

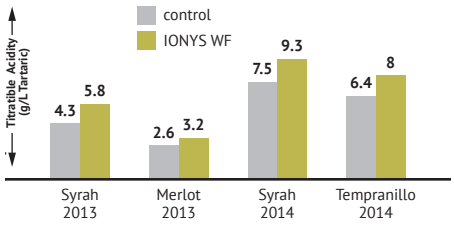
Frequently used in reds from warmer climates with high pH and high potential alcohol

500 g – #15233

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 1 g/L glucose and fructose to be fermented), when nitrogen is adequate fermentation speed is moderate with a long, but steady stationary phase
- Maintaining a temperature range of 25–28°C (77–82°F) will optimize glycerol production (up to 15 g/L) and potentially decrease alcohol 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); once opened use immediately

Acidifying Effects of IONYS$_{WF}$



K1 (V1116)

Strong fermenter for high ester production under challenging conditions

Alcohol Tolerance: 18%

Nitrogen Needs: LOW

Temp. Range: 10-35°C (50-95°F)

Frequently used in aromatic whites, Chenin blanc, cider

500 g – #15063
10 kg – #15077

LALVIN K1 (V1116)™ is one of the highest ester producing strains in our portfolio.

- Strong floral ester producer and is well-suited to juices lacking aromatic complexity
- 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

MSB

Isolate from Marlborough for zesty, tropical New Zealand style Sauvignon blancs

Alcohol Tolerance: 14.5%

Nitrogen Needs: MEDIUM

Temp. Range: 14-20°C (57-68°F)

Frequently used in Sauvignon blanc, Colombard, Chenin blanc

500 g – #15267

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

- Freshness and zesty characters are maintained due to minimal malic acid uptake
- Moderate rate fermenter, low H_2S and SO_2 producer
- *Saccharomyces cerevisiae bayanus* strain
- Isolated from the Marlborough Valley in New Zealand

MT

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

Alcohol Tolerance: 15%
Nitrogen Needs: MEDIUM
Temp. Range: 15-32°C (59-90°F)

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

500 g – #15650
10 kg – #15651

VITILEVURE MT™ is known for producing aromas of strawberry and caramel, especially in Merlot, and is recommended for grapes with high maturity and long aging potential.

- Wines have good color intensity and tannin structure
- Displays steady fermentation kinetics and produces minimal volatile acidity and H_2S
- *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

NBC

Burgundy selection for modern and fresh aromatic whites and rosés

Alcohol tolerance: 15%
Nitrogen needs: MED-HIGH
Temp. Range: 14-20°C (57-68°F)

Frequently used in Chardonnay, Chenin blanc, Pinot gris, Chardonnel, aromatic whites, rosés, Rhône whites

500 g – #15656

LALVIN NBC™ was selected for making fresh and refined Chablis-style Chardonnay with enhanced floral, citrus, and mineral notes, but is also well-suited for making rosés and Rhône style whites.

- Wines are described as elegant and well-balanced with fresh fruit aromas and preserved acidity
- Suitable for barrel fermentations and has excellent compatibility with malolactic bacteria
- Has a short lag phase, low production of SO_2, and acetaldehyde
- *Saccharomyces cerevisiae cerevisiae* strain
- Isolated from a Chardonnay fermentation by the Centre Oenologique de Bourgogne (COEB), France

Fruit-Forward Reds

NT 116

All-purpose strain for New World style whites and reds

Alcohol Tolerance: 16%
Nitrogen Needs: MEDIUM
Temp. Range: 12-28°C (54-83°F)

Frequently used in Syrah, Cabernet Sauvignon, Merlot, Petite Sirah, Pinot gris, aromatic whites, full-bodied and high maturity red wines destined for oak aging, cider

1 kg – #15185
10 kg – #15226

NT 116™ is equally suited for white and red winemaking due to its release of varietal aromas and mannoproteins, and the production of glycerol and esters, giving aromatic complexity and roundness.

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

NT 202

Structured and complex reds

Alcohol Tolerance: 16%
Nitrogen Needs: MEDIUM
Temp. Range: 18-27°C (64-82°F)

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

1 kg – #15191
10 kg – #15227

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

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

LOW H_2S and SO_2 | Fruit-Forward Reds

PERSY

LALLEMAND YSEO

Varietal expression and mouthfeel in fruit-forward red wines

Alcohol Tolerance: 16%

Nitrogen Needs: LOW

Temp. Range: 15-27°C (59-82°F)

Frequently used in Rhône reds, Pinot noir, Tempranillo, other reds susceptible to H_2S production

500 g – #15261
10 kg – #15262

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

- Especially suitable for wines that struggle with H_2S and sulfur off-odors
- Wines have red fruity aromas, spicy notes, a balanced mouthfeel with good entry and mid-palate and integrated tannins
- No to very low SO_2, H_2S, and acetaldehyde production which further enhances fruit expression
- *Saccharomyces cerevisiae* hybrid
- Developed in collaboration with National Agricultural Research Institute (INRA), SupAgro Montpellier, and Lallemand Oenology

Why are specialty yeasts special?

THEY CAN FINISH FERMENTATION UNDER STRESSFUL CONDITIONS WITHOUT MAKING OFF-ODORS AND FLAVORS

Yeast can naturally produce compounds like hydrogen sulfide (H_2S), acetaldehyde, and sulfur dioxide (SO_2) during fermentation, especially when stressed. Understandably, the metabolic pathways within yeast that lead to the production of these compounds have been a large focus of genetic research and selective breeding.

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

Some yeast traits are genetically complex and traditional selective breeding and screening methods are an ineffective tool to target these traits. For example, if we breed two strains of wine yeast, one that produces low levels of H_2S and another that produces low levels of SO_2, it is not guaranteed that the daughter yeast is both a low H_2S and low SO_2 producer. This is because these traits are controlled and influenced by a large group of genes.

Quantitative Trait Loci (QTL) is a technique that allows us to pinpoint the location of all genes involved in complex yeast traits. Now when we selectively breed yeast we can quickly screen daughter strains for the desired trait. Combining QTL mapping with selective breeding has allowed Lallemand Oenology to produce a line of **no to very low H_2S, SO_2, and acetaldehyde producing strains** including **ICV OPALE 2.0™, ICV OKAY™, SENSY™** and **PERSY™**. This is a non-GMO technique and all QTL process strains are naturally bred.

Check the yeast choosing charts on pages 16-21 and look for those marked for No-Low H_2S, SO_2, production for other strains with these traits.

QA23

LALLEMAND YSEO

Strong fermenter for varietal expression in highly clarified white juice

Alcohol Tolerance: 16%

Nitrogen Needs: LOW

Temp. Range: 15-32°C (59-90°F)

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

500 g – #15652
10 kg – #15653

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

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

R2

Expression of varietal aromas at cold temperatures

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 10-30°C (50-86°F)

Frequently used in Riesling, Sauvignon blanc, Gewürztraminer, late harvest, aromatic whites, cider

500 g – #15071

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 5°C (41°F)
- Tends to produce VA without proper nutrition or when stressed
- *Saccharomyces cerevisiae bayanus* strain
- Isolated in the Sauternes region of Bordeaux, France

RC212

Enhanced structure and color in Pinot noir

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 16-30°C (60-86°F)

Frequently used in Pinot noir, Grenache, Cabernet Franc

500 g – #15057
10 kg –#15097

LALVIN RC 212® 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
- *Saccharomyces cerevisiae cerevisiae* strain
- Selected in Burgundy, France, by the Bureau Interprofessional des Vins de Bourgogne (BIVB)

RHÔNE 2226

Complexity and balance in high alcohol reds

Alcohol Tolerance: 18%

Nitrogen Needs: HIGH

Temp. Range: 15-27°C (59-82°F)

Frequently used in Merlot, Zinfandel, Sangiovese, Barbera, Cabernet Franc, Petite Sirah, structured reds

500 g – #15644
10 kg – #15645

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
- 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

RHÔNE 4600

Aromatic and elegant whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 13-22°C (56-72°F)

Frequently used in rosés, Viognier, Chardonnay, Rhône whites, cider

500 g – #15171

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
- 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

R-HST

LALLEMAND

Strong fermenter for Riesling and other aromatic whites

Alcohol Tolerance: 15%

Nitrogen Needs: MEDIUM

Temp. Range: 10-30°C (50-86°F)

Frequently used in Riesling, Gewürztraminer, Sauvignon blanc, Viognier, Rhône whites, aromatic whites, cider

500 g – #15130

LALVIN R-HST™ retains fresh varietal character while contributing structure and mouthfeel.

- It can produce crisp, premium white wines with citrus and floral notes
- Highly suitable for late harvest and ice wine production
- 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

RP15

LALLEMAND YSEO

Complex, balanced, and concentrated reds

Alcohol Tolerance: 17%

Nitrogen Needs: MEDIUM

Temp. Range: 20-30°C (68-86°F)

Frequently used in Syrah, Zinfandel, Merlot, Cabernet Sauvignon, Cabernet Franc, Petite Sirah, Malbec, Petit Verdot, Tempranillo, structured reds

500 g – #15665
10 kg – #15666

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

NEW

Fruit-Forward Reds

RUBY

LALLEMAND YSEO

For the optimal expression of thiols, aromatic complexity, and freshness in red wines

Alcohol Tolerance: 16%

Nitrogen Needs: LOW

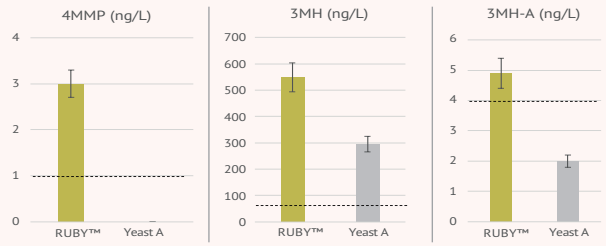
Temp. Range: 16-28°C (61-82°F)

Frequently used in Cabernet Sauvignon, Merlot, Malbec, Syrah, Pinot noir, Tempranillo, Grenache

500 g – #15702

RUBY™ is an innovative new yeast with specific metabolic capabilities that can help reveal thiols in red varieties. Recent research has shown that many red grape varieties contain thiols and they play an important role in red wine complexity.

- Wines are described as intense, fresh, and complex with aromas of red fruit (raspberry and cherry), black fruit (blackcurrant and plum), and spices
- Wines have fine tannic structure, good volume, and a persistent finish
- *Saccharomyces cerevisiae cerevisiae* strain



SAUVY

For mega expression of grassy thiols

Alcohol Tolerance: 14%

Nitrogen Needs: MEDIUM

Temp. Range: 14-20°C (57-68°F)

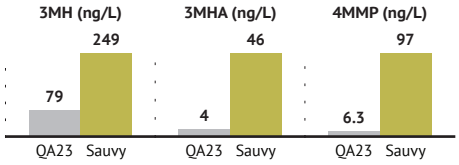
Frequently used in Sauvignon blanc, Chenin blanc, Pinot gris, Riesling, rosés

500 g – #15258
10 kg – #15272

SAUVY™ was selected to help winemakers make New Zealand style Sauvignon blanc, but it does equally well in expressing thiols of other varietals.

- In cooler growing regions, SAUVY may express more 4MMP, a grassy thiol precursor, and using SAUVY may result an intensely grassy wine
- In warmer growing regions, SAUVY may produce wines that still express the grassy character but are more balanced, crisp, and refreshing
- SAUVY can help increase the aromatic expression of less expressive grapes
- SAUVY produces very low to no H_2S, SO_2, and volatile acidity
- *Saccharomyces cerevisiae cerevisiae* strain

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



Why are specialty yeasts special? **THEY CAN ENHANCE VARIETAL CHARACTER**

Grapes contain thiols and terpenes which are compounds that contribute to varietal aroma. Many thiols and terpenes are released into juice in an odorless, bound form (bound to amino acids and sugars). *Saccharomyces* yeasts can produce enzymes that release these aroma compounds from their bound molecules and convert them into an odor-active form. These enzymes include beta-lyases, which cleave thiols from amino acids, and beta-glucosidases, which cleave terpenes from sugars. Yeast strains vary in their production of these enzymes, and a great example of this is **SAUVY**. **SAUVY was selected for its over-expression of beta-lyase which results in the optimal release of grassy aromas.**

The effectiveness of beta-lyase varies among yeast strains, largely influenced by the IRC_7 gene. The IRC_7 gene has two alleles which exist in two versions: long form (higher beta-lyase expression) and short form (not fully functional beta-lyase). There are also two different versions of the IRC_7 long form allele: an original version and an altered version (which can decrease thiol release by up to 80%). Only 3% of all wine yeasts have both the **double IRC_7 long form allele** in the **original version**. The only commercially available yeasts with both traits are **SAUVY** and **RUBY**!

Check the yeast choosing charts on pages 16-21 and look for those marked for enhanced varietal character (EVC) for more strains can release varietal aromas (terpenes or thiols, or both).

LOW **H_2S and SO_2**

SENSY

Varietal aroma production under difficult conditions for whites and rosés

Alcohol Tolerance: 15%

Nitrogen Needs: LOW

Temp. Range: 12-17°C (54-64°F)

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

500 g – #15225

LALVIN SENSY™ respects varietal aromas and produces aromatic esters while balancing mouthfeel and freshness.

- Especially suitable for wines that struggle with H_2S and sulfur off-odors
- Enhances citrus and tropical fruit aromas and contributes subtle mineral notes
- SENSY has a very short lag phase
- Total SO_2 prior to inoculation should not exceed 50 ppm
- *Saccharomyces cerevisiae* hybrid
- Selected in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), SupAgro Montpellier, Institut Coopératif du Vin (ICV), and Lallemand Oenology

SYRAH

Spicy, fruity, and floral reds

Alcohol Tolerance: 16%

Nitrogen Needs: MEDIUM

Temp. Range: 15-32°C (59-90°F)

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

500 g – #15657
10 kg – #15658

ENOFERM SYRAH™ offers good mouthfeel, stable color extraction, and enhances varietal aromas.

- Typical aromas include berry (strawberry and raspberry), plum, violet, and 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™ or GO-FERM STEROL FLASH™ and nutrition management is essential
- *Saccharomyces cerevisiae cerevisiae* strain
- Isolated from the Côtes du Rhône region, France

T73

Strong fermenter for varietal complexity in hot climate reds

Alcohol Tolerance: 16%
Nitrogen Needs: LOW
Temp. Range: 18-32°C (65-90°F)

Frequently used in Merlot, Zinfandel, Sangiovese, Tempranillo, fruit-forward reds

500 g – #15091

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

Fruit-Forward Reds

TANGO

Balanced reds with perception of sweetness

Alcohol Tolerance: 15.5%
Nitrogen Needs: MEDIUM
Temp. Range: 15-27°C (59-82°F)

Frequently used in Malbec, Syrah, Tempranillo, Merlot, Petite Sirah

500 g – #15252

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

VIN 13

Robust strain with good aroma expression

Alcohol Tolerance: 17%
Nitrogen Needs: LOW
Temp. Range: 12-16°C (54-61°F)

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

1 kg – #15183
10 kg – #15228

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, robustness, and aromatic expression, making this strain suitable for challenging winemaking conditions and for juice lacking aromatic complexity
- Temperature control is advised during fermentation
- *Saccharomyces cerevisiae* hybrid
- Product of the yeast hybridization program at the Institute for Wine Biotechnology, University of Stellenbosch, South Africa

VIN 2000

Full-bodied aromatic whites

Alcohol Tolerance: 15.5%
Nitrogen Needs: LOW
Temp. Range: 13-16°C (55-61°F)

Frequently used in Chenin blanc, Chardonnay, Sauvignon blanc, Viognier, Albariño

1 kg – #15195

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
- Temperature control is advised
- *Saccharomyces cerevisiae* hybrid
- Product of the yeast hybridization program at the Institute for Wine Biotechnology, University of Stellenbosch, South Africa

VRB

Balance and mouthfeel in high alcohol reds

Alcohol Tolerance: 17%

Nitrogen Needs: MEDIUM

Temp. Range: 15-27°C (59-82°F)

Frequently used in Cabernet Franc, Tempranillo, Barbera, Sangiovese, Zinfandel, Petite Sirah, fruit-forward reds, Nebbiolo, hybrids

500 g – #15173

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

Fruit-Forward Reds

W15

Clean fermenter at low temperatures

Alcohol Tolerance: 16%

Nitrogen Needs: HIGH

Temp. Range: 10-27°C (50-81°F)

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

500 g – #15118
10 kg – #15119

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 of high levels of sugar, making it an ideal choice for late harvest and ice wines.

- White wines display spicy, floral, and citrus aromas and mouthfeel is well-balanced
- Red wines display bright fruit aromas and good structure
- Low heat generation during fermentation helps winemakers minimize the potential for temperature spikes and possible hydrogen sulfide (H_2S) production
- *Saccharomyces cerevisiae cerevisiae* strain
- Isolated from a Müller-Thurgau fermentation in 1991 at the Swiss Federal Research Station in Wädenswil, Switzerland

ADDITIONAL RESOURCES

Please scan the codes below or visit our website to view our guide about how to troubleshoot stuck or sluggish alcoholic fermentations and our article on why yeast rehydration is better than direct inoculation

Scan here to see our guide on troubleshooting stuck or sluggish fermentations alcoholic fermentations scottlab.com/fermentation-troubleshooting

Scan here to learn about why yeast rehydration is better than direct inoculation scottlab.com/rehydration

PROTOCOL

YEAST REHYDRATION WITH GO-FERM STEROL FLASH™

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

PREPARE REHYDRATION NUTRIENT:

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

((gal) **Box 1** / gallons of juice/must × 2.5) ÷ 1000 = (lbs) **Box 2** / pounds of GO-FERM STEROL FLASH

((lbs) from Box 2 / pounds of GO-FERM STEROL FLASH × 10) ÷ 8.33 = (gal) / gallons of water for rehydration

REHYDRATE YEAST:

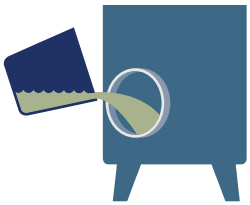
2. Add 25 g/hL (2 lb/1000 gal) of active dried yeast.

((gal) from Box 1 / gallons of juice/must × 2) ÷ 1000 = (lbs) / pounds of yeast

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

INOCULATE:

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



Note: Prior to inoculation ensure that the temperature difference between the yeast slurry and the juice or must is within 10°C (18°F). If juice/must is not within 10°C (18°F) of the yeast slurry add some juice or must to the yeast slurry to drop the temperature. Let stand 15-20 minutes, mix, then inoculate.

For large tanks with long filling times add the yeast slurry to the bottom of the fermentation vessel just as you begin filling with must/juice. This allows the yeast a head start over indigenous organisms.

PROTOCOL

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

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

PREPARE REHYDRATION NUTRIENT

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

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

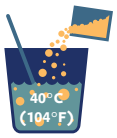
$$\frac{(\text{gal})\ \textbf{Box 1} \times 2.5}{\text{gallons of juice/must}} \div 1000 = \frac{(\text{lbs})\ \textbf{Box 2}}{\text{pounds of GO-FERM PROTECT EVOLUTION}}$$

$$\frac{(\text{lbs})\ \text{from Box 2} \times 20}{\text{pounds of GO-FERM PROTECT EVOLUTION}} \div 8.33 = \frac{(\text{gal})}{\text{gallons of 43°C (110°F) water for rehydration}}$$

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

REHYDRATE YEAST

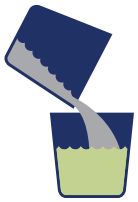
2. Allow temperature of yeast rehydration nutrient solution from step 1 to drop to 40°C (104°F).
3. Add 25 g/hL (2 lb/1000 gal) of active dried yeast.



$$\frac{(\text{gal})\ \text{from Box 1} \times 2}{\text{gallons of juice/must}} \div 1000 = \frac{(\text{lbs})}{\text{pounds of yeast}}$$

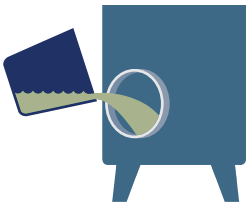
4. Stir gently to break up any clumps and let suspension stand for 20 minutes, then stir gently again. Foaming is not an indicator of yeast viability. Do not let yeast stand in rehydration water longer than 30 minutes without adding juice or must or yeast viability will decline.

ACCLIMATIZE



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

INOCULATE



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

For large tanks with long filling times add the yeast slurry to the bottom of the fermentation vessel just as you begin filling with must/juice. This allows the yeast a head start over indigenous organisms.

PROTOCOL

RESTART A STUCK FERMENTATION USING UVAFERM 43 RESTART

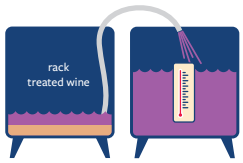
PREPARE THE STUCK WINE:

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

Step 1*: Add SO_2 or a 25 g/hL addition of BACTI-LESS™ or lysozyme if spoilage bacteria is a concern.

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

Step 3: Allow RESKUE to settle for 48 hours.



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

PREPARE THE STARTER MIXTURE**:

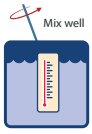
*When adding yeast to a stuck wine environment with high alcohol and low sugar, yeast must be **very** carefully acclimatized so they can successfully complete fermentation. These steps prepare a wine mixture that is lower in alcohol and higher in sugar than the stuck wine, which will help slowly acclimate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

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

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

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

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



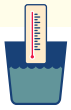
Step 8: Mix well. Maintain temperature of 20–25°C (68–77°F).

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

If using GO-FERM STEROL FLASH™, add 53 g/hL (4.4 lbs/1000 gal) of GO-FERM STEROL FLASH to 10 times its weight of clean 15°C (60°F) water. Then proceed to step 11.

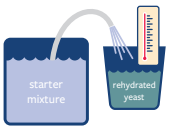


Step 10: Allow solution to cool to 40°C (104°F).

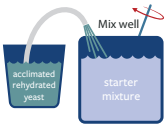
Step 11: Add 40 g/hL (3.3 lbs/1000 gals) of UVAFERM 43 RESTART™ yeast. Stir gently and let stand for 20 minutes, then stir gently again. *Calculate the amount of yeast needed based on the volume of stuck wine, not the starter mixture.*

FIRST ACCLIMATIZATION:

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



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



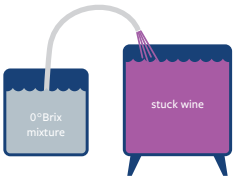
Step 13: Mix the acclimatized (yeast from step 12) with the rest of the starter mixture (from step 8).

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

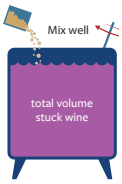
Step 15: Allow this mixture to drop to 0° Brix. This should take between 18 and 48 hours.

SECOND ACCLIMATIZATION/ INOCULATION:

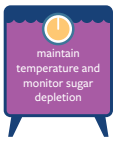
These steps continue the acclimatization of yeast and then inoculates the yeast into the stuck wine.



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.

***Step 1:** Do not use BACTILESS in this step if malolactic fermentation hasn't completed but is desired.*

****Steps 5 and 7:** We recommend adding water and sugar (in the form of cane sugar or grape juice concentrate) to maximize the success of restarting fermentations. However, there are state and federal regulations that address adding sugar and water during the winemaking process. Please check applicable regulations to ensure compliance.*

WORKSHEET – USING UVAFERM 43 RESTART

Step 2
Calculate RESKUE addition and water needed for re-suspension

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

((lbs) from Box 1 pounds of RESKUE × 10) ÷ 8.33 = (gal) gallons of water

Step 4
Note the new volume after racking

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

WATER +

(gal) from Box 2 gallons of stuck wine × 0.04 = (gal) gallons of **water** for starter mixture = (gal) **Box 3** gallons of starter mixture

Step 6
Calculate FERMAID O addition to starter

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

Step 9
Calculate amount of GO-FERM PROTECT EVOLUTION and amount of water needed for yeast rehydration

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

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

Or:
GO-FERM STEROL FLASH

((gal) from Box 2 gallons of stuck wine × 4.4) ÷ 1000 = (lbs) **Box 4** pounds of GO-FERM STEROL FLASH

((lbs) from Box 4 pounds of GO-FERM STEROL FLASH × 10) ÷ 8.33 = (gal) gallons of water

Step 11
Calculate amount of UVAFERM 43 RESTART needed for restart

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

Step 17
Calculate FERMAID O addition to reinoculated fermentation.

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

♥

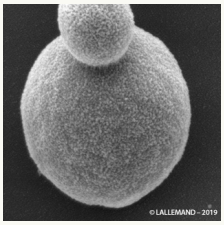
NON-SACCHAROMYCES YEAST

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

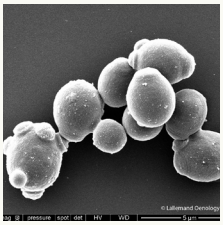
Non-Sacc yeast have not historically been selected and dried for winemaking applications. However, in the last decade, there's been an explosion of research on winemaking applications for non-Sacc yeast. These yeast are as varied in their applications and strain differences as their *Saccharomyces* cousins.

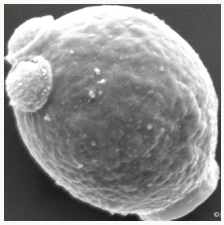
WHAT'S SO COOL ABOUT NON-SACC YEAST?

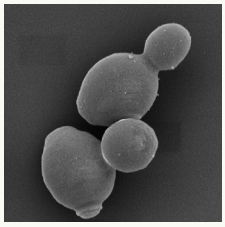
Non-Sacc yeast have unique abilities that differ from *Saccharomyces* yeast. *Saccharomyces* yeast are reliable fermenters with the ability to impact wine aroma, flavor, and texture. Non-Sacc are not reliable fermenters because they are inhibited by alcohol. However, some non-Sacc yeast from the genera *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

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

ANTIOXIDATION

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

ACIDIFICATION

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

AROMA AND MOUTHFEEL ENHANCEMENT

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

DID YOU KNOW?

THERE ARE SPECIAL CONSIDERATIONS WHEN USING NON-SACC YEAST

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

Rehydration temperature: Non-Sacc yeast are rehydrated at a lower temperature than *Saccharomyces* (see pg 51).

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

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

You may not need to use 25 g/hL: For some non-Sacc strains, dosage can be adapted based on certain winemaking conditions, such that you might not need 25 g/hL! See pg 49 for more information.

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	Outcompetes VA-producing native microflora via microbial crowding	Scavenges oxygen and thereby outcompetes VA-producing native microflora	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*	To the tank prior to alcoholic fermentation	To the tank prior to alcoholic fermentation	Directly to grapes (to protect during transport or cold soak)	To freshly pressed juice to protect during transportation or cold settling	To the tank prior to alcoholic fermentation
When to add *Saccharomyces*	After 1.5-4 °Brix drop	24 hours after FLAVIA	Upon receipt, or end of cold soak	Once juice is racked to fermentation vessel	24-72 hours after LAKTIA
Suggested compatible *Saccharomyces* strains	Any strain that meets your winemaking goal	Strains with ß-glycosidase activity (Denoted as strains that enhance varietal characters)	Any strain that meets your winemaking goal. 3001 is specifically recommended for use in Pinot noir musts that have undergone cold soak	Any strain that meets your winemaking goal	Any strain that meets your winemaking goal

Fruit-Forward Reds

BIODIVA

LALLEMAND

Aromatically complex wines with roundness and volume

When to add BIODIVA:
Directly to fermentation vessel

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

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

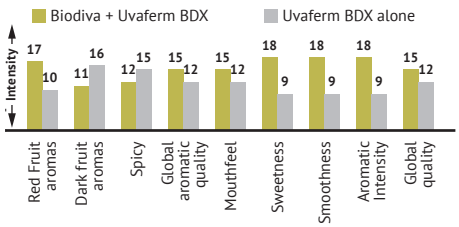
Frequently used in Chardonnay, Viognier, Chenin blanc, Merlot, Grenache, Syrah, Pinot noir, fruit-forward reds, late harvest, cider

500 g – # 15697

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

- In red wines, red fruit aromas and overall aromatic intensity are enhanced. Mouthfeel softness is also enhanced, and wines have a perception of sweetness
- White wines show fruity (tropical, white fruits), floral, and pastry notes
- Mildly fermentative and can produce up to 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
- 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

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



Usage: See pg 51 for rehydration instructions.
Storage: Dated expiration. Store at 20°C (68°F). Once opened use immediately.

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

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: <15 ppm
Temp: >15-22°C (59-71°F)

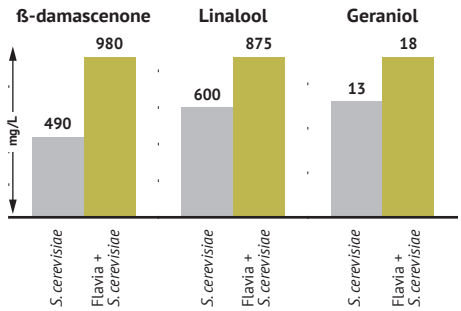
Frequently used in Sauvignon blanc, Riesling, Pinot gris, Muscat, Colombard, rosés, cider

500g – #15244

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

- Wines have heightened tropical fruits, citrus, floral, and spicy aromas
- Positively impacts mouthfeel due to the fast release of mannoproteins
- Non-fermentative but 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 Universidad de Santiago de Chile (USACH)

Impact of FLAVIA on Floral Aromatics



Usage: See pg 51 for rehydration instructions.
Storage: Dated expiration. Store at 4-11°C (39-52°F). Once opened use immediately.

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

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
Temp: 4-20°C (39-68°F)

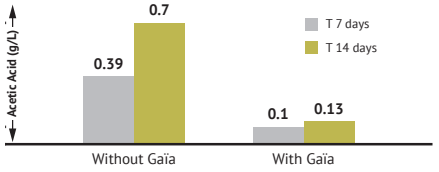
Frequently used in Pinot noir, reds undergoing cold soak

500g – #15686

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. Once rehydrated, GAIA can be added directly to the grapes during harvest (with a sprayer or into each picking bin) or to red grapes at the beginning of cold soak.

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

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



Usage: See pg 51 for rehydration instructions.
Storage: Dated expiration. Store at 4-11°C (39-52°F). Once opened use immediately.

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

Why are specialty yeasts special? **THEY CAN BE USED AS ANTI-MICROBIAL TOOLS**

Grape juice is a complex microbial soup and highly susceptible to spoilage. Traditionally SO_2 has been used to control indigenous yeast and bacteria and oxidation damage, however, the effectiveness of SO_2 is limited pre-fermentation (due to binding with sugar and other must components). Inoculating with wine yeast can help to outcompete these indigenous microorganisms, but there is a still a window of time where juice/must is unprotected until the inoculation occurs. Selected non-*Saccharomyces* yeasts can be added to help protect juices and musts during this window.

By introducing them early in the pre-fermentation phase, non-*Saccharomyces* yeasts like **GAIA™** and **LEVEL2 INITIA™** will exert selective pressure on the indigenous microorganisms. They achieve this through their very presence, by producing antimicrobial compounds, or by depleting specific substrates from the juice/wine. These mechanisms, solely or in combination, allow these non-*Saccharomyces* yeast to act as an antimicrobial or bio-protection agent. For example, **GAIA**, a *Metschnikowia fructicola* strain, can be added to red grapes to help suppress the damage caused by indigenous microorganisms. On the other hand, INITIA, a *Metschnikowia pulcherrima* strain, excels in outcompeting unwanted microflora and rapidly consumes oxygen during the critical pre-fermentation phase, thus securing the juice from microbial contamination and oxidative damage.

DID YOU KNOW?

HOW TO DETERMINE THE RIGHT DOSE OF GAIA™ & LEVEL² INITIA™

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

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

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

Use 7 g/hL if:	When adding GAIA/INITIA to **picking bins** in the vineyard
	Grapes are **cold** (< 10°C/50°F)
	Protection needed for **less than 4 days**
	Clean fruit

Use 10 g/hL if:	When adding GAIA/INITIA to **grapes upon receipt** or to **freshly pressed juice**
	Grapes/juice is **cold** (< 10°C/50°F)
	Protection needed for **less than 4 days**
	Clean fruit

Use 20 g/hL if:	When adding GAIA/INITIA to **grapes upon receipt** or to **freshly pressed juice**
	Grapes/juice is **cool** (around 10°C/50°F)
	Protection needed for **more than 4 days**
	Clean fruit

Use 25 g/hL if:	When adding GAIA/INITIA to **machine harvested fruit** or to **freshly pressed juice**
	Grapes/juice are **not cool** (> 10°C/50°F)
	Protection needed for **more than 4 days**
	Compromised/damaged fruit

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

INITIA

LALLEMAND

Protects aromas and color from oxidative damage

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

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

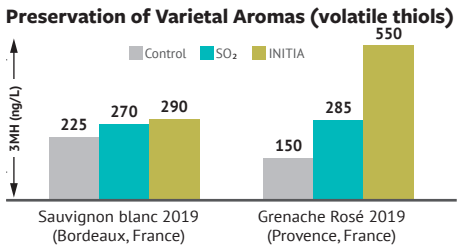
Optimal conditions:
Free SO_2: <15 ppm
Total SO_2: <40 ppm
Temp: 4-20°C (39-68°F)

Frequently used in aromatic whites, rosés, cider

500g – #15273

LEVEL² INITIA™ consumes oxygen to protect aroma and color from oxidative damage and to suppress the growth of native, volatile acidity (VA) producing microorganisms. This bioprotective effect means that juice can be protected from microbial spoilage during thawing, clarification or during short-term juice storage and chemical additives like sulfur dioxide (SO_2) can be minimized, and in some cases avoided.

- 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
- Can reduce the use of SO_2 in canned or no- and low-SO_2 wines
- Very low fermentative abilities, grows well at low temperature and can tolerate up to 3% alcohol
- *Metschnikowia pulcherrima* strain
- Isolated in Burgundy by the Institut Français de la Vigne et du Vin (IFV) in Beaune, France



Usage: See pg 51 for rehydration instructions.
Storage: Dated expiration. Store at 4-11°C (39-52°F). Once opened use immediately.

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

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
Temp: 14-28°C (57-82°F)

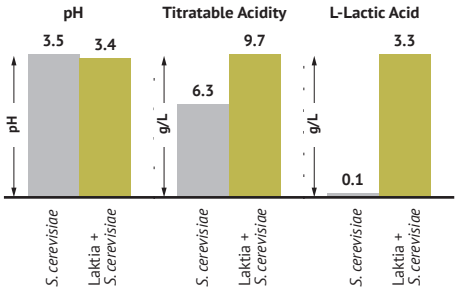
Frequently used in hot climate grapes that are lacking in acidity, cider

500 g – #15253

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

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

Impact of LAKTIA on Acidity in a 2017 Tempranillo



Usage: See pg 51 for rehydration instructions.
Storage: Dated expiration. Store at 20°C (68°F). Once opened use immediately.

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

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.

Why are specialty yeasts special? **THEY CAN IMPACT ACIDITY**

Acidity is important to wine balance as well as stability. Winemakers can increase acidity by adding tartaric or other acids and decrease acidity by inducing malolactic fermentation or adding salts like potassium bicarbonate. However, certain *Saccharomyces* and non-*Saccharomyces* yeast can also impact acidity, providing options for those who want to avoid malolactic fermentation or certain additions.

LAKTIA™, a specialized non-*Saccharomyces* yeast, directly contributes to acidity by converting glucose into lactic acid without depleting other natural acids. This unique metabolic pathway can result in significant acidification (2-9 g/L of lactic acid).

IONYS WF™ is a *Saccharomyces* yeast that overproduces glycerol and organic acids (malic, alpha-ketoglutaric, and succinic) which can result in a titratable acidity increase of 0.4-1.4 g/L. These yeasts can be particularly beneficial for wines produced from hot-climate grapes.

On the other hand, **LALVIN 71B** is a *Saccharomyces* yeast that can decrease acidity by degrading malic acid. This can be beneficial in situations where malolactic fermentation isn't desired, or when initial malic acid is extremely high and a malolactic fermentation may become inhibited by the resulting lactic acid.

Check the yeast choosing charts on pages 16-21 and look for those marked that can reduce malic acid.

PROTOCOL

NON-SACCHAROMYCES YEAST:
BEST PRACTICES & REHYDRATION INSTRUCTIONS

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

- Different strains of non-Sacc yeast are added at different points in the winemaking process
- Non-Sacc yeast cannot complete alcoholic fermentation because they are inhibited by alcohol. When using a non-*Saccharomyces* strain, subsequent inoculation with a *Saccharomyces* strain is required.
- Each non-Sacc yeast strain operates best under certain temperature and free SO_2 conditions.

TIMING OF INOCULATIONS:

	BIODIVA™	FLAVIA™	GAIA™	INITIA™	LAKTIA™
When to add non-*Saccharomyces*:	To the tank prior to alcoholic fermentation	To the tank prior to alcoholic fermentation	Directly to grapes to protect during transport or cold soak	To freshly pressed juice to protect during transport or cold settling	To the tank prior to alcoholic fermentation
When to add *Saccharomyces*:	After 1.5-4 °Brix drop	24 hours after FLAVIA	Upon 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	<15	<50 **Total SO_2**	<15	<15
Temperature	>16°C (61°F)	15-22°C (59-71°F)	4-20°C (39-68°F)	4-20°C (39-68°F)	14-28°C (57-82°F)

INSTRUCTIONS:

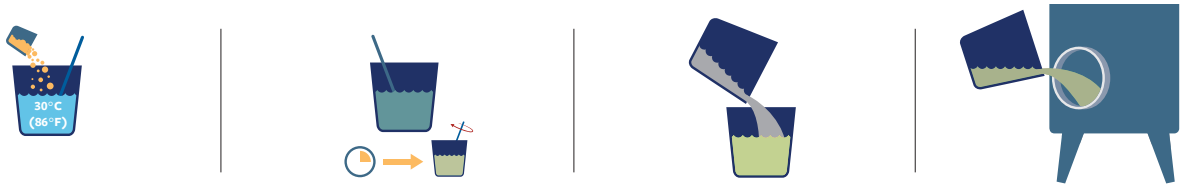
Step 1: Rehydrate non-Sacc yeast in 10x its weight of chlorine-free water at 30°C (86°F). Stir.

Step 2: Wait 15 minutes and stir again.

Step 3: Slowly add juice or must to the yeast slurry until the temperature of the yeast slurry drops by 10°C (18°F). Wait 15 min. Repeat this step until slurry is within 10°C (18°F) of must. NOTE: this step should not exceed 45 minutes total.

Step 4: Inoculate.

Step 5: After inoculating with your chosen non-Sacc yeast strain, consult the chart above to determine when to inoculate with *Saccharomyces* to finish alcoholic fermentation.



Step 1 | Step 2 | Step 3 | Step 4

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.

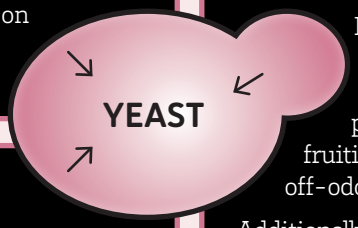
Our nutrients go beyond preventing stuck fermentations. We discovered that specific nutrients can protect and stimulate aromas, protect color, and help manage negative sensory compounds. Our advanced and unrivaled yeast nutrients and derivatives help take your wine to the next level.

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

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



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

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

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

WHAT NUTRIENTS ARE PRESENT IN GRAPES?

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

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

HOW MUCH NUTRIENT SHOULD BE ADDED?

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

Initial juice chemistry. Higher sugar and lower YAN fermentations will both require higher levels of YAN supplementation. It is crucial to measure YAN and sugar immediately prior to fermentation. Wineries may conduct pre-fermentation processes like clarification or cold-soaking that take a few days. During this time, native microflora will consume YAN as well as vitamins and minerals, even in healthy fruit and juices or musts. Measuring YAN before these processes may not accurately represent the YAN at inoculation.	**Yeast strain nutrient needs**. Different yeast strains have different nitrogen demands and are classified as low, medium, or high nitrogen need according to the following: • Low nitrogen-demand: 7.5 ppm YAN per 1 °Brix • Medium nitrogen-demand: 9 ppm YAN per 1 °Brix • High nitrogen-demand: 12.5 ppm YAN per 1 °Brix **Fruit quality**. The presence of molds and rot will impact grape juice or must chemistry. Studies have shown that grapes impacted by *Botrytis cinerea* and other molds are highly deficient in YAN and other essential nutrients.
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. 66 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 terms. Typical amino acid analysis measures only the nitrogen content of assimilable amino acids, so that number is used directly when calculating YAN.

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

QUICK GUIDE TO CHOOSING YEAST NUTRIENTS & DERIVATIVES

NUTRIENT TYPE	REHYDRATION NUTRIENTS			FERMENTATION NUTRIENTS				
Pg#	56	57	57	58	59	59	60	60
PRODUCT NAME	NEW **GO-FERM STEROL FLASH**	**GO-FERM PROTECT EVOLUTION**	**GO-FERM**	**STIMULA CABERNET**	**STIMULA CHARDONNAY**	**STIMULA PINOT NOIR**	**STIMULA SAUVIGNON BLANC**	**STIMULA SYRAH**
STAGE OF WINEMAKING	During yeast rehydration			During alcoholic fermentation				
PRIMARY ACTIVITY	**Significantly enhances** fermentation kinetics, **contributes to maximum yeast vitality** and aroma production		Enhances fermentation kinetics	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	Stimulates **black and red fruit aromas, minimizes greenness, minimizes sulfur off-odors**, 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
	Super speedy rehydration, eliminates need for warm water	Requires warm water and acclimatization steps						
BEST USED IN	All wines			Big reds, Bordeaux-style reds	Fruity and floral whites and rosés	Pinot noir and other light-bodied reds, especially if susceptible to herbaceousness and H_2S	Aromatic whites and rosés, especially if thiol-containing	Medium-bodied reds, especially if susceptible to H_2S
FORMULATION	Autolyzed yeast **extra rich in sterols**, vitamins, and minerals	Autolyzed yeast rich in **sterols**, vitamins, and minerals	Autolyzed yeast rich in vitamins, and minerals	Organic nitrogen (amino acids, specific peptides), vitamins, and minerals. The amount and type of each will vary depending on the product, accounting for their different sensory impacts.				
MEASURABLE YAN (in ppm) AT 40g/hL	Contains some nitrogen but is not a significant source of YAN and is not a replacement for fermentation nutrients.			16	16	16	16	16
YAN 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

What Are Rehydration Nutrients?

Rehydration nutrients supply yeast with vitamins and minerals, and newer GO-FERM® 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

FERMENTATION NUTRIENTS		YEAST DERIVATIVE NUTRIENTS						
58	61	62	62	63	63	64	64	65
FERMAID O	**FERMAID K**	**GLUTASTAR**	**RESKUE**	**NOBLESSE**	**OPTI-MUM RED**	**OPTI-RED**	**OPTI-WHITE**	**REDULESS**
During alcoholic fermentation		Anytime before or during fermentation (alcoholic or malolactic)						
Workhorse yeast nutrient for clean, steady ferments with enhanced aroma production	**Basic yeast nutrient** for improved yeast performance. Used for supplementing very low YAN fermentations.	Acts as an **antioxidant (protects color and aromas)** in aromatic whites and rosés, and can help **lower SO_2 use**	Removes toxic compounds to **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)	**Combats sulfur off-odors** and other negative sensory compounds
All wines	Wines with very low starting YAN	Aromatic white and rosé juice	All wines	All wines	High tannin reds	Medium and light tannin reds	Complex whites and rosés	All wines
Organic nitrogen (amino acids), vitamins, and minerals.	Blend of organic nitrogen (amino acids) and inorganic nitrogen (DAP), with added vitamins, and minerals	Fully autolyzed yeast rich in reduced glutahione (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 with cell walls rich in copper
16								
64-96	40	Contains some nitrogen but is not a significant source of YAN and is not a replacement for fermentation nutrients.						
YES	NO	YES	NO	YES	YES	YES	YES	YES

What Are Yeast Derivative Nutrients?

Yeast derivative nutrients are made from highly-specialized yeast strains and prepared using specific techniques to enrich the nutrient with 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.*

Rehydration Nutrients

NEW

Fruit-Forward Reds

GO-FERM STEROL FLASH

Advanced rehydration nutrient for use with cool water; ORMI listed

Nutrient Type:
Rehydration Nutrient

When to add:
During yeast rehydration

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

YAN contribution:
Insignificant

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

1 kg – #15164
2.5 kg – #15166
10 kg – #15167

GO-FERM STEROL FLASH™ is a revolutionary new yeast rehydration nutrient that can be used with cool water, significantly shortening the rehydration process. Rehydrated yeast can be directly added to juice/must after 15 minutes.

- Has all the benefits of GO-FERM PROTECT EVOLUTION™
- Allows yeast to be rehydrated in cool water (minimum 15°C/60°F) without any loss of viability or vitality
- Eliminates time-consuming acclimatization steps
- Requires 50% less water than other rehydration nutrients
- Non-clumping, instantly disperses in cool water
- Derived from autolyzed yeast, provides optimized levels of micronutrients (vitamins and minerals) and extremely high levels of survival factors including sterols and unsaturated fatty acids

Usage: See pg 42 for rehydration instructions
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

THE HISTORY OF GO-FERM® REHYDRATION NUTRIENTS

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

2000

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

2013

GO-FERM™ PROTECT EVOLUTION, released in 2013, advanced fermentation success by contributing to maximal yeast vitality for sustained fermentative power and aroma production. **GO-FERM PROTECT EVOLUTION** has been optimized with respect to the quantity and quality of micronutrients and sterols it provides to the yeast during the rehydration phase.

2023

In 2023 we introduced the latest generation of rehydration nutrients; GO-FERM STEROL FLASH™. This product brings all of the advantages of GO-FERM PROTECT EVOLUTION but allows the yeast to be rehydrated with cellar temperature water, **bypassing the need for acclimatization and significantly shortening the yeast rehydration process**.

GO-FERM STEROL FLASH saves serious time during rehydration

GO-FERM® & GO-FERM PROTECT EVOLUTION™

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

TOTAL TIME:
≥ 1 hour

GO-FERM STEROL FLASH™

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

TOTAL TIME:
<20 min

Fruit-Forward Reds

GO-FERM PROTECT EVOLUTION

Advanced rehydration for use with hot water; OMRI listed

Nutrient Type:
Rehydration Nutrient

When to Add:
During yeast rehydration

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

YAN contribution:
Insignificant

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

2.5 kg – #15103
10 kg – #15251

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

- Benefits include: faster onset and cleaner finish of fermentation, healthier yeast that can better withstand fermentation stresses like ethanol, acid, sugar, and temperature, greater expression of varietal aromas, and fewer fermentation sensory issues like volatile acidity (VA) and hydrogen sulfide (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)
- Derived from autolyzed wine yeast, provides optimized levels of micronutrients (vitamins and minerals) and high levels of survival factors including sterols and unsaturated fatty acids

Usage: See pg 43 for rehydration protocol. Note: Due to the unique nature of GO-FERM PROTECT EVOLUTION, it will not go into solution completely.
Storage: Dated expiration. Store in a cool and dry environment at 18°C (65°F). Once opened, keep tightly sealed and dry.

Recommended Dosage	30 g/hL	2.5 lb/1000 gal

GO-FERM

Yeast rehydration nutrient; OMRI listed

Nutrient Type:
Rehydration Nutrient

When to Add:
During yeast rehydration

Provides:
Vitamins and minerals that help yeast withstand the conditions of fermentation

YAN contribution:
Insignificant

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

10 kg – #15161

GO-FERM® is the original yeast rehydration nutrient. It enhances fermentation kinetics and helps prevents fermentation problems. Unlike GO-FERM STEROL FLASH and GO-FERM PROTECT EVOLUTION, it does not enhance aroma production or expression.

Usage: See pg 43 for rehydration protocol
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

Scan here learn more about the magic of GO-FERM® rehydration nutrients - scottlab.com/go-ferm♥

Fermentation Nutrients

FERMAID O

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

Nutrient Type:
Fermentation Nutrient

When to Add:
2-3 °Brix drop and/or 1/3 sugar depletion

Provides:
YAN in the form of organic nitrogen

Measurable YAN at 40 g/hL dose:
16 ppm

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

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

2.5 kg – #15067
10 kg – #15107

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

Fruit-Forward Reds

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 for maximum ester production

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

Measurable YAN at 40g/hL dose:
16 ppm

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

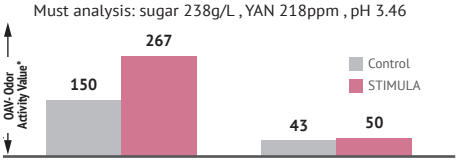
Frequently used in Bordeaux style reds, fruit-forward reds, musts with underripe characters

1kg – #15268
10kg – #15288

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

Impact of STIMULA CABERNET™ on red and black fruits aromas on a 2019 Cabernet Sauvignon from Bordeaux, France
Must analysis: sugar 238g/L , YAN 218ppm , pH 3.46



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

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.

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

STIMULA CHARDONNAY

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

Nutrient Type:
Fermentation Nutrient

When to Add:
1/3 sugar depletion for maximum ester production

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

Measurable YAN at 40 g/hL dose:
16 ppm

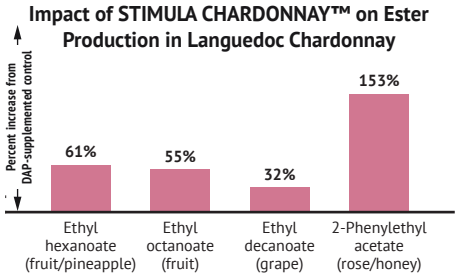
YAN equivalents at 40 g/hL dose:
64-96 ppm

Frequently used in aromatic whites, rosés, cider

1 kg – #15245
10 kg – #15260

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

- Wines are aromatically intense and complex with increased fruity (white and yellow fruits), tropical, and floral aromas (see Figure)
- Palate is lengthened and mouth-feel 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 1/3 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 cool and dry environment at 65°F (18°C). Once opened, keep tightly sealed and dry.

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

Fruit-Forward Reds

STIMULA PINOT NOIR

YAN source that elevates Pinot noir characteristics

Nutrient Type:
Fermentation Nutrient

When to Add:
2-3 °Brix drop

Provides:
YAN in the form of organic nitrogen (amino acids), vitamins and minerals that stimulate yeast to produce complex 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 Pinot noir, light-bodied reds

1 kg – #15290

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

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

Usage: Mix STIMULA PINOT NOIR in 10 times its weight of clean water or must and add to the fermentation at 2–3 °Brix drop. It is essential that the timing of addition is respected. STIMULA PINOT NOIR is not fully soluble. Stir to maintain suspension before and during addition.
Storage: Dated expiration. Store in a dry environment at 18°C (65°F). Once opened, use immediately.

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

STIMULA SAUVIGNON BLANC

LALLEMAND

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

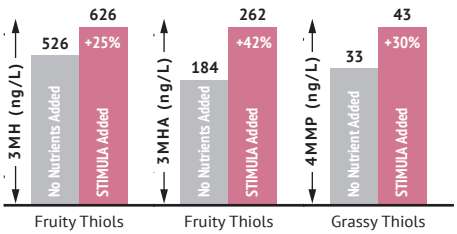
Frequently used in Sauvignon blanc, Riesling, Pinot gris, Chardonnay, Semillon, rosés

1 kg – #15246
10 kg – #15255

STIMULA SAUVIGNON BLANC™ is an organic nitrogen source that contributes YAN while stimulating the yeast's ability to reveal and enhance varietal compounds in white and rosé wines.

- Added at the onset of active fermentation, the specific formulation helps yeast take up aroma precursors (varietal thiols, terpenes, and norisoprenoids) and convert them into odor-active compounds
- Enhances varietal characteristics resulting in increased tropical fruits, citrus, and grassy aromas (Figure). Wines also have a fuller mouthfeel and fewer sulfur off-odors, like H_2S

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



- When used to produce rosé wines, blackcurrant aromas can be present
- Well-balanced nutrient rich in amino acids, vitamins (pantothenate, thiamin, and folic acid), minerals (zinc and manganese), and sterols
- Latest generation of yeast-based nutrients focusing on nutrition and aroma production

Usage: Mix STIMULA SAUVIGNON BLANC in 10 times its weight of clean water or juice and add to the fermentation at 2–3 °Brix drop. It is essential that the timing of addition is respected. STIMULA SAUVIGNON BLANC is not fully soluble. Stir to maintain suspension before and during addition.
Storage: Dated expiration. Store in a dry environment at 18°C (65°F). Once opened, use immediately.

Recommended Dosage	40g/hL	3.3 lb/1000 gal

Fruit-Forward Reds

STIMULA SYRAH

LALLEMAND

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 40 g/hL dose:
16 ppm

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

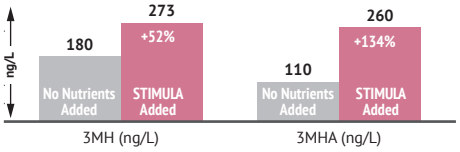
Frequently used in Syrah, Tempranillo, Merlot, other reds susceptible to H_2S production

1kg – #15269

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

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



- Well-balanced nutrient rich in amino acids and small peptides, vitamins (pantothenate and thiamin), minerals (magnesium), and sterols
- Latest generation of yeast-based nutrients focusing on nutrition and aroma production

Usage: Mix STIMULA SYRAH in 10 times its weight of clean water or must and add to the fermentation at 2-3 °Brix drop. It is essential that the timing of addition is respected. STIMULA SYRAH is not fully soluble. Stir to maintain suspension before and during addition.
Storage: Dated expiration. Store in a dry environment at 18°C (65°F). Once opened, use immediately.

Recommended Dosage	40g/hL	3.3 lb/1000 gal

FERMAID K

YAN source for use in low YAN fermentations

Nutrient Type:
Fermentation Nutrient

When to Add:
1/3 sugar depletion

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

Measurable YAN at 25 g/hL dose:
25 ppm

YAN equivalents at 25 g/hL dose:
25 ppm

Frequently used in juices and musts with low starting YAN

2.5 kg – #15073
10 kg – #15070

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.

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

Note: Some of the materials in FERMAID K are listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information, please visit TTB.gov.

DIAMMONIUM PHOSPHATE (DAP)

IOC

YAN source supplying inorganic nitrogen (ammonia)

Frequently used in juices and musts with severely deficient YAN

5 kg – #15805

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.

DID YOU KNOW?

WHY WE RECOMMEND STAGED NUTRIENT ADDS

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

During rehydration

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

After lag phase (2–3 °Brix drop)

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

During fermentation (1/3 sugar depletion)

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

Yeast Derivative Nutrients

GLUTASTAR

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

Nutrient Type:
Yeast Derivative Nutrient

When to Add:
Directly to juice post-pressing

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

YAN contribution:
Insignificant

Frequently used in aromatic whites, rosés, cider

1 kg – #15265
10 kg – #15266

GLUTASTAR® protects aroma precursors and color due to its unique antioxidant capacity meaning that wines are aromatic and flavorful and color is brighter.

- Positive impact on varietal and fermentation- derived aromas (Figure 1)
- Protects juice and wine color (Figure 2)
- Effects are long-lasting, leading to prolonged wine shelf-life
- Acts as an antioxidant due to its specialized (nucleophilic) peptides and reactive glutathione that scavenge quinones, halting the oxidation cascade
- Can reduce the use of sulfur dioxide (SO_2) in canned or no- and low-SO_2 wines
- 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

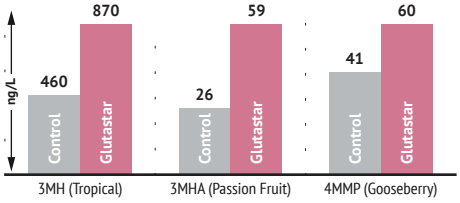
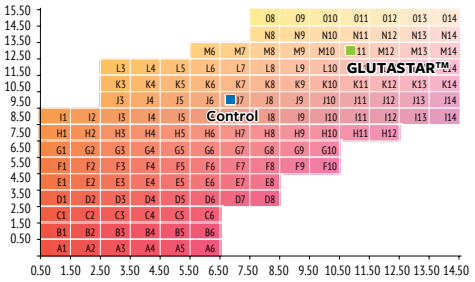


Figure 2:
Color Analysis in a 2018 Provence Rosé of Syrah/Grenache. Trial Compares Control Wine with GLUTASTAR added after Pressing



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

Recommended Dosage	30 g/hL	2.5 lb/1000 gal

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)

1 kg – #15224
10 kg – #15242

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 44 and 45).
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

Fruit-Forward Reds

NOBLESSE

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

Nutrient Type:
Yeast Derivative Nutrient

When to Add:
Anytime during alcoholic or malolactic fermentation

Provides:
Polysaccharides that add a perception of sweetness and enhance mouthfeel

YAN contribution:
Insignificant

Frequently used in reds, complex whites, rosés, cider

2.5 kg – #15105

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

- Wines appear to have more fruit aromas and sweetness due to the contribution of low molecular weight polysaccharides
- Decrease in tannin intensity and a reduction in drying and aggressive characters due to the softening effect of high molecular weight polysaccharides
- Can be used at any time during fermentation, and although immediate results are possible, full impact 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

OPTI-MUM RED

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

Nutrient Type:
Yeast Derivative Nutrient

When to Add:
Directly to grapes or at first mixing

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

YAN contribution:
Insignificant

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

1 kg – #15229
10 kg – #15250

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 the polysaccharides from OPTI-MUM RED
- Reduces the perception of green, astringent tannins in cool-climate or low maturity fruit
- Reduces the sensation of hotness in high alcohol wines
- The mannoprotein portion of this autolyzed yeast helps soften mouthfeel
- The yeast strain behind OPTI-MUM RED was specifically selected and fully autolyzed for its highly reactive high molecular weight polysaccharides and oligosaccharides

Usage: Mix OPTI-MUM RED in 10 times its weight of water or must and add directly to the grapes or must. If adding later in fermentation, add during a pump-over or during tank mixings. This product is mostly soluble. Stir to maintain suspension before and during addition.
Storage: Dated expiration. Store in a cool, dry environment at 18°C (65°F). Once opened, keep tightly sealed and dry.

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

OPTI-RED

For rounder and smoother tannins in reds; OMRI listed

Nutrient Type:
Yeast Derivative Nutrient

When to Add:
Anytime during alcoholic or malolactic fermentation

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

YAN contribution:
Insignificant

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

1 kg – #15148
2.5 kg – #15138
10 kg – #15211

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

OPTI-WHITE

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

Nutrient Type:
Yeast Derivative Nutrient

When to Add:
Anytime during alcoholic or malolactic fermentation

Provides:
Polysaccharides and antioxidant peptides that balance mouthfeel and protect aromas

YAN contribution:
Insignificant

Frequently used in complex whites, rosés, cider

1 kg – #15165
2.5 kg – #15136
10 kg – #15216

OPTI-WHITE® stabilizes and integrates aromas, brings smoothness and complexity, and can also help prevent oxidative damage*.

- Provides both peptides and polysaccharides; the peptides help protect aromatics and color, while the polysaccharides integrate and stabilize aroma compounds and enhance smoothness
- 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 62) 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 vessel prior to the onset of fermentation. If adding during the later stages of alcoholic fermentation, add during vessel 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

**Please see scottlab.com for current pricing. For a complete price list of all items in this book, see scottlab.com/order-planner.*

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 cell walls naturally rich in copper residues for the treatment of sulfur-off odors

YAN contribution:
Insignificant

Frequently used in rosés, whites, reds, cider

1 kg – #15116
2.5 kg – #15115

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 vegetal and phenolic notes
- Inactivated yeast with cell walls rich in copper
- REDULESS should be removed from wine via a racking or filtration in case of the unlikely event that copper is released into the wine. Maximum copper transfer is 0.3 ppm when used at 30 g/hL

Usage: Mix REDULESS in 10 times its weight in water. Add immediately to the tank. If prepared in advance, re-suspend the product prior to its addition to the fermentor. Gently mix and rack off or filter after 72 hours. The maximum potential copper contribution when used according to the recommendation is 0.3 ppm. 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 - Bench trials recommended	
10-30 g/hL	0.8-2.5 lb/1000 gal

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 22-41

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 STEROL FLASH (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, PINOT NOIR, or SYRAH (40 g/hL)		
	Increase Fruity Esters	N/A	FERMAID O (20 g/hL)	FERMAID O (40 g/hL)
At 1/3 Sugar Depletion	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 CABERNET (40 g/hL)		

NUTRITION PLAN

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

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

ADDITIONAL RESOURCES

Please scan the codes below or visit our website to view our in depth articles on the importance of yeast rehydration and nutrition.

Scan here to learn why amino acids are better than ammonia (DAP) for yeast nutrition
scottlab.com/aminoacids

Scan here to learn about the importance of yeast rehydration nutrients
scottlab.com/rehydration-nutrients

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.

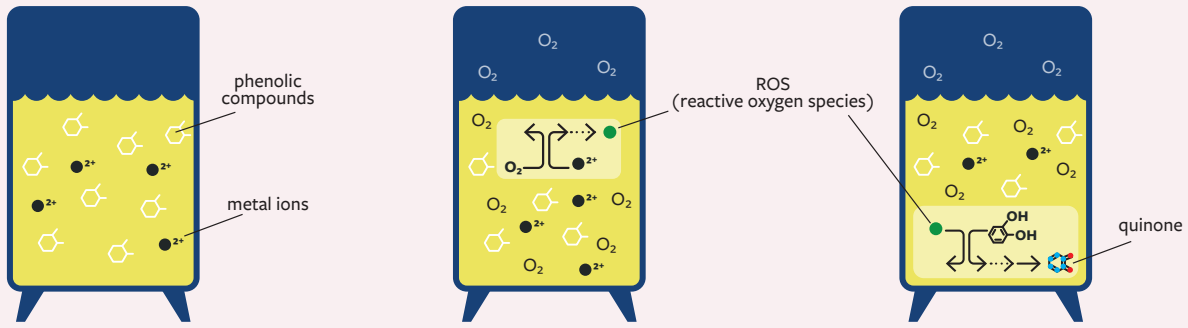
THE OXIDATION CASCADE

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 susceptible 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.**

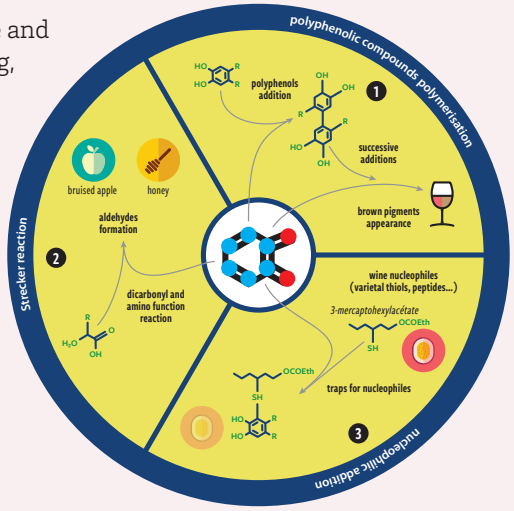


Figure 2: Quinone Reactions in Wine

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 quinone reactions by directly binding with the quinones and ensuring they cannot interact with other juice and wine compounds. However, SO_2 can have a negative impact on wine sensory properties, can delay the onset of malolactic fermentation, and is incompatible with specific packaging types (cans). Additionally, SO_2 has been of particular concern to consumers desiring "low chemical input" wines.

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

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

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

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

CHOOSING ANTIOXIDANT PRODUCTS

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

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

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

MALOLACTIC BACTERIA

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

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

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

THE IMPACT OF WINE CONDITIONS ON MALOLACTIC BACTERIA

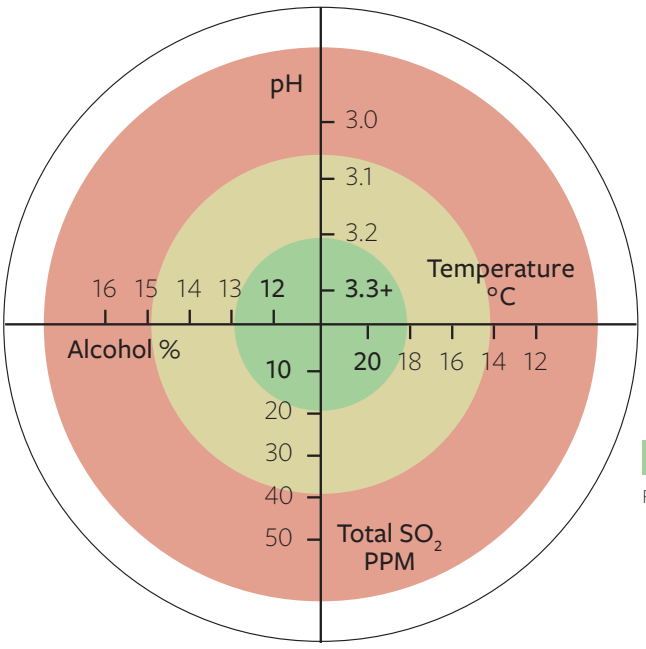
The success of malolactic fermentation (MLF) can be largely attributed to four parameters: pH, temperature, ethanol, and SO_2. These parameters cannot be viewed independently since they have a compounding effect on the growth and metabolism of malolactic bacteria. For example, a wine with low pH and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

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

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.
SULFUR DIOXIDE (SO_2)	**In all forms, SO_2 can be problematic to 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 favorable conditions are: free SO_2 <10 ppm, total SO_2<45 ppm, and molecular SO_2 <0.3 ppm.

OPTIMAL AND CHALLENGING CONDITIONS FOR MALOLACTIC BACTERIA

EFFECT OF WINE CONDITIONS ON ML FERMENTATION



pH

Favorable: >3.2

Challenging: 3.05-3.2

Harsh: <3.05

TEMPERATURE

Favorable: 20-22°C (68-72°F)

Challenging: <15°C (60°F)

Not advised: >25°C (75°F)

ALCOHOL LEVEL

Favorable: <13% (v/v)

Challenging: 13-15% (v/v)

Harsh: >15% (v/v)

SULFUR DIOXIDE (SO_2)*

Favorable:

Free SO_2 <10 ppm,
Total SO_2 <45 ppm
Molecular SO_2 <0.3 ppm

Challenging:

Free SO_2 >10 ppm,
Total SO_2 >60 ppm
Molecular SO_2 >0.3 ppm

Harsh:

Free SO_2 >15 ppm,
Total SO_2 >75 ppm
Molecular SO_2 >0.5 ppm

QUICK GUIDE TO CHOOSING MALOLACTIC BACTERIA

		BETA CO-INOC	ALPHA	BETA	ELIOS 1	LALVIN MBR 31	O-MEGA	PN4	SILKA	SOLO SELECT	VP41	MALOTABS
Pg#		73	74	74	75	75	76	76	77	77	78	78
Alcohol tolerance (% v/v)		<15.0	<15.5	<15.0	<15.5	<14.0	<16.0	<15.5	<16.0	<16.0	<16.0	<16.0
pH limit		>3.2	>3.2	>3.2	>3.5	>3.1	>3.1	>3.1	>3.3	>3.2	>3.1	>3.2
Total SO_2 limit (ppm)		<60	<50	<60	<35	<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°)	>14° (57°)	>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 16-21)
- Use 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™ (pg 133) or lysozyme (pg 133) to inhibit the bacteria and prevent VA production.

BETA CO-INOC

LALLEMAND

Co-inoculation strain for fresh and fruit-forward wines

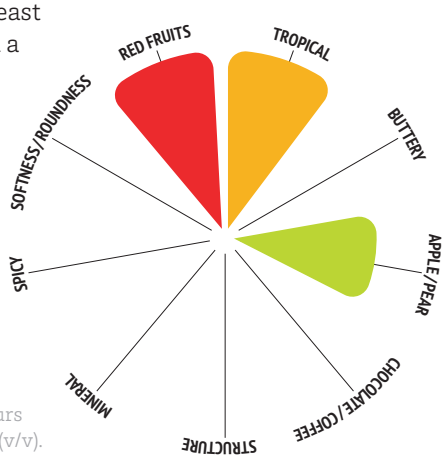
Alcohol Tolerance: <15%
pH: >3.2
Total SO_2 at crush: <60 ppm
Temp: **At inoculation** 18–25°C (64–77°F) **During fermentation** 14-28°C (57-82°F) **Last 1/4 fermentation** <75°F if malic acid is still present

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

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

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
- *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 133) or DELVOZYME® (pg 133) once MLF is finished 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).

Bacteria for Sequential Inoculation

ALPHA

LALLEMAND

Robust and versatile strain for aroma complexity and mouthfeel enhancement

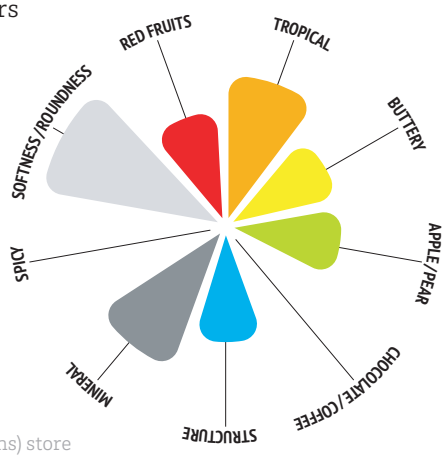
Alcohol Tolerance: <15.5%
pH: >3.2
Total SO_2: <50 ppm
Temp: >57°F

Frequently used in whites, rosés

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

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 (IFV), Burgundy, France



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

Fruit-Forward Reds

BETA

LALLEMAND

Enhanced varietal aroma and diacetyl production

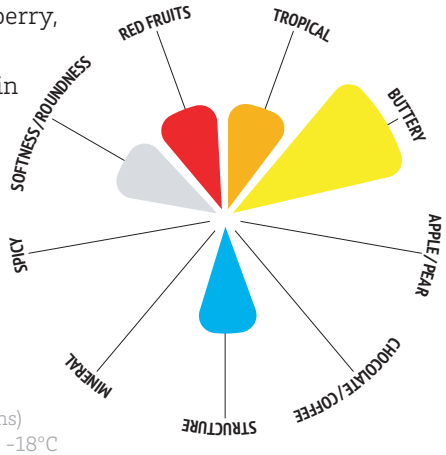
Alcohol Tolerance: <15%
pH: >3.2
Total SO_2: <60 ppm
Temp: >57°F

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

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

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 its production of the fruity and floral compounds β-damascenone and β-ionone.

- Produces buttery aromas and flavors in white wines. If the wine is left on the lees, the buttery notes are decreased and tropical fruit aromas like pineapple and mango are revealed
- Supports tannin structure and red fruit, berry, and floral notes in red wines
- BETA is a high nutrient-demanding strain and benefits from the addition of either ACTI-ML™, OPTI'MALO BLANC™, or ML RED BOOST™ (pg 79)
- Selected for its robustness and ability to enhance aromas while respecting grape varietal characteristics
- *Oenococcus oeni* isolated from the Abruzzo region of Italy



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

ELIOS 1

Enhanced fresh fruit, spice, and tannin integration

Alcohol Tolerance*: <15.5%
pH: >3.5
Total SO_2: <35 ppm
Temp: >64°F

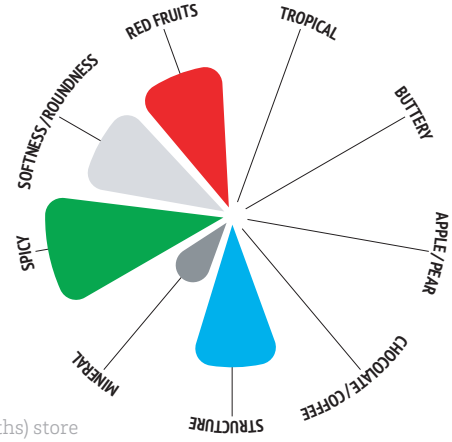
Frequently used in medium-bodied reds, full-bodied reds

**pH tolerance of ELIOS 1 is improved (down to pH 3.4) when the alcohol is <14% and TSO2 <50 ppm*

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

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).

LALVIN (MBR) 31

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

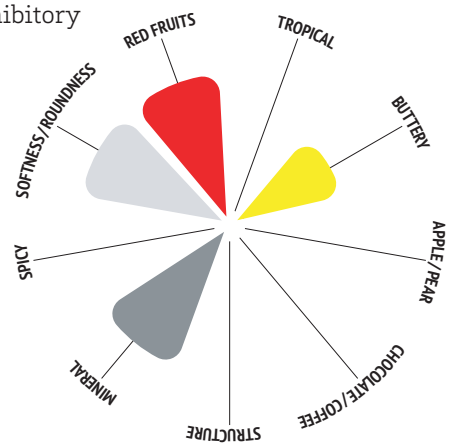
Alcohol Tolerance: <14%
pH: >3.1
Total SO_2: <45 ppm
Temp: >55°F

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

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

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

- In white wines, it adds complexity due to its light buttery flavor. With lees contact the buttery notes decrease, elevating fruit flavors and mineral notes
- In red wines, dark berry fruit flavors, color stability, and mouthfeel are increased
- Tolerant of high levels of lactic acid (from high starting malic acid levels) that can be inhibitory to other ML strains
- Selected for its capacity to achieve malolactic fermentation in low pH and low temperature situations
- Due to its high nutrient demand, it is sometimes slow to start but finishes quickly, especially when used in conjunction with OPTI'MALO BLANC®, or ML RED BOOST™ (pg 79)
- *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).

Fruit-Forward Reds

O-MEGA

Strong fermenter for balance, freshness, and fruit expression

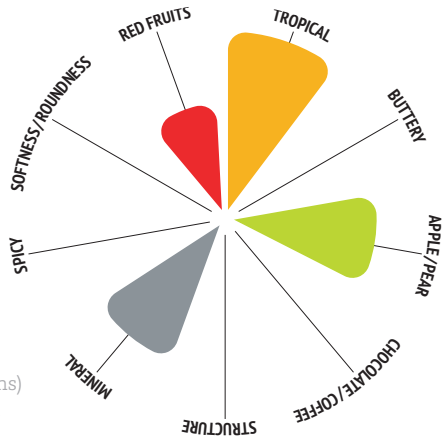
Alcohol Tolerance: <16%
pH: >3.1
Total SO_2: <60 ppm
Temp: >57°F

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

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

O-MEGA™ is the most robust strain in the Scott Laboratories' portfolio, well suited to conducting malolactic fermentation in high alcohol, low temperature, or low pH situations.

- 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 (not recommended for wines with herbaceous or vegetative notes, as these can be amplified)
- 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).

Fruit-Forward Reds

PN4

Fast fermenter for enhanced spice, fruit, and mouthfeel

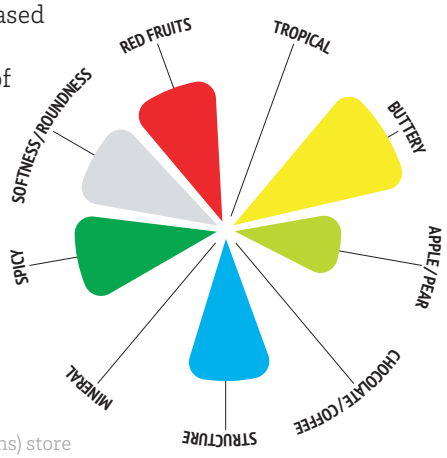
Alcohol Tolerance: <15.5%
pH: >3.1
Total SO_2: <60 ppm
Temp: >61°F

Frequently used in complex whites, big and spicy reds

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

PN 4® 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
- Selected 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).

Fruit-Forward Reds

SILKA

Silky mouthfeel, aromatic balance, and good oak integration

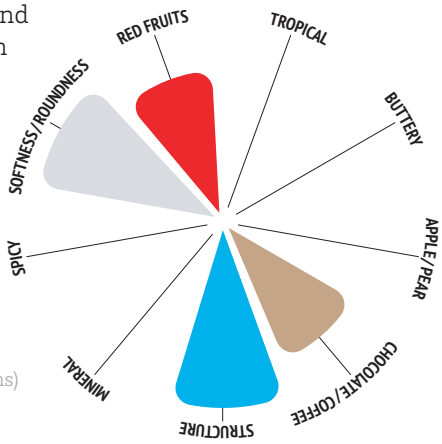
Alcohol Tolerance: <16%
pH: >3.3
Total SO_2: <60 ppm
Temp: >59°F

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

25 hL (660 gal) dose – #15624

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 toasted oak, balanced by aromas and flavors of red currant, blackberry, and cherry
- SILKA has a moderate nutrient demand and benefits from the malolactic fermentation nutrient ML RED BOOST™ (pg 79)
- 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).

SOLO SELECT

Fast fermenter for enhanced structure and spiciness

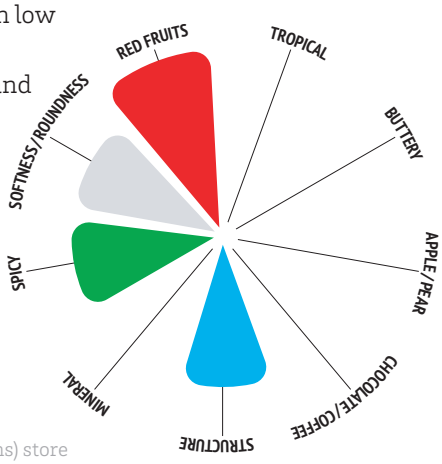
Alcohol Tolerance: <16%
pH: >3.2
Total SO_2: <50 ppm
Temp: >57°F

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

25 hL (660 gal) dose – #15270

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 79)
- 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).

VP41

All-purpose strain for enhanced complexity and mouthfeel

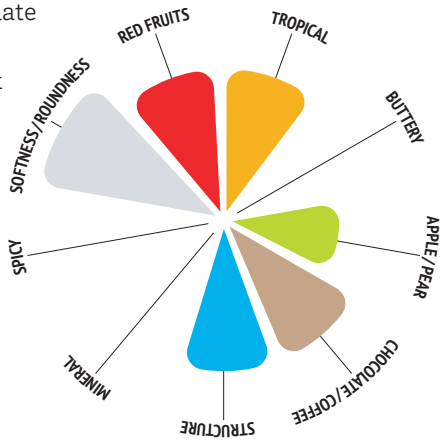
Alcohol Tolerance: <16%
pH: >3.1
Total SO_2: <60 ppm
Temp: >61°F

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

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

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 81)
- 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).

MALOTABS

Oenococcus oeni in tablet form for easy barrel additions

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

Frequently used in rosés, whites, reds

Box of five 2.5 hL (66 gal) doses – #15049

MALOTABS™ are an innovative and easy-to-use tablet form of malolactic bacteria for direct addition into barrels. MALOTABS disperse immediately upon addition to the barrel, 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).

Nutrients for Bacteria

ACTI-ML

Bacteria rehydration nutrient

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

1 kg – #15681

ACTI-ML™ is 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

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 stuck malolactic fermentations, OMRI listed

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

1 kg – #15218

ML RED BOOST™ compensates for nutrient deficiencies and improves the survival rate of bacteria 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 in both red and white wines (see protocol on pg 79)

Usage: Suspend in small amount of water or wine and then add directly to the wine just before adding the malolactic bacteria. In very high tannin wines, 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

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

1 kg – #15217

OPTI'MALO BLANC™ helps overcome the challenges of malolactic fermentation in white and rosé wines by compensating for nutritional deficiencies, stimulating the growth and malic acid metabolism of the bacteria, and decreasing MLF duration, allowing wines to be stabilized more quickly.

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

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

OPTI'MALO PLUS

General malolactic fermentation nutrient

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

1 kg – #15141

OPTI'MALO PLUS® 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
- Results in higher bacteria survival rate and shorter malolactic fermentation
- ML RED BOOST™ (pg 79) is the preferred MLF nutrient over OPTI'MALO PLUS for red wines and OPTI'MALO BLANC™ (pg 79) is preferred for white and rosé wines

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

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

TEMPERATURE MIGHT BE TOO LOW

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

ALCOHOL MAY BE TOO HIGH

If the wine alcohol level is higher than the tolerance of the bacteria, restart may be necessary using a strain with a higher alcohol tolerance. See pg 81 for restart instructions.

SO_2 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 81 for restart instructions). TSO_2 may also be lowered via blending.

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 81 for restart instructions.

MALIC AND LACTIC ACID MAY BE TOO HIGH

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

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

THE BACTERIA MIGHT BE STRUGGLING TO STAY IN SUSPENSION

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

THE WINE MIGHT BE LACKING NUTRIENTS

Malolactic bacteria have specific nutrient needs, but there are no easy/cost-effective analyses that can help determine deficiencies in wine. ML bacteria require organic acids (malic, citric, pyruvic), organic nitrogen (amino acids, peptides), vitamins (B group), trace minerals (Mn, Mg, K, Na), and low 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 62).

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 pgs 71-72 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

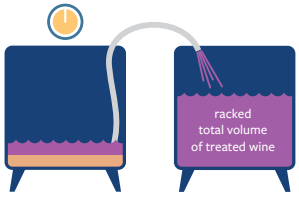
RESTART A STUCK MALOLACTIC FERMENTATION USING VP41

PREPARE THE STUCK WINE

Step 1: Add 30 g/hL (2.5 lb/1000 gal) of RESKUE™ prior to restarting. Suspend RESKUE in 10 times its weight of warm water at 30–37°C (86–98°F) (see pg 62 for more about RESKUE). Wait 20 minutes then add to stuck wine.

((gal) **Box 1** / gallons of stuck wine × 2.5) ÷ 1000 = (lbs) **Box 2** / pounds of RESKUE

((lbs) from Box 2 / pounds of RESKUE × 10) ÷ 8.33 = (gal) / gallons 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). This is the optimal temperature for malolactic fermentation.

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.

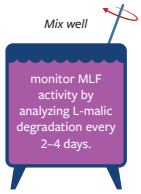
((gal) from Box 1 / gallons of stuck wine × 1.7) ÷ 1000 = (lbs) / pounds of ML RED BOOST

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 / gallons of stuck wine × 2) = (gal) / 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) 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 feasibility evaluation was created to help practically represent this phenomenon.

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

ML BACTERIA FEASIBILITY EVALUATION

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

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

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

TOTAL SCORE:

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

CHECK OUT OUR WINE STYLE GUIDES

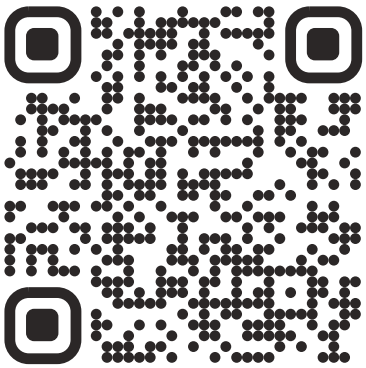
Winemakers can drive wine style based on key processing decisions and product choices. We created these Scott Labs wine style guides to provide both process and product recommendations for helping winemakers achieve their stylistic goals.

Chardonnay Wine Style Guide
scottlab.com/chardonnay

Rhône White Wine Style Guide
scottlab.com/rhone

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

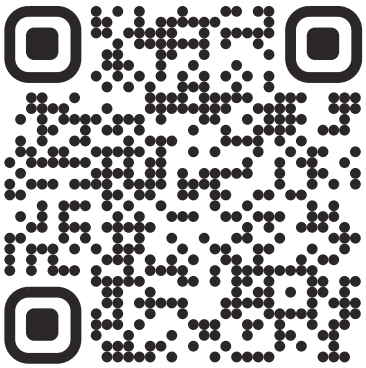
Rosé Wine Style Guide
scottlab.com/rose



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

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

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



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

TANNINS & OAK

Tannins

Tannins are one the most versatile and underestimated tools in the winemakers' toolbelt. Often only appreciated for their contributions to structure and mouthfeel, tannins are also a natural way to prevent oxidative damage, as well as impact wine flavor and aroma. Their impact happens relatively quickly, and often a small addition can create big results.

Oak

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

TANNINS

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

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

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

SENSORY IMPACT OF TANNINS

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

ANTIOXIDATION

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

ENHANCES AROMA

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

BUILDS STRUCTURE

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

INCREASES VOLUME/ROUNDNESS

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

MASKS GREENNESS

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

STABILIZES COLOR

DID YOU KNOW?

BENCH TRIALS ARE RECOMMENDED WHEN USING TANNINS!

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

QUICK GUIDE TO CHOOSING TANNINS

Product Name	ESSENTIAL ANTIOXIDANT	ESTATE	FT BLANC	FT BLANC SOFT	FT ROUGE	FT ROUGE SOFT	ONYX	RADIANCE
Pg#	88	88	89	89	90	90	91	91
Frequently used in	Whites, rosés, fruit wines, cider	Reds	Whites, rosés, fruit wines, cider	Whites, rosés, reds, fruit wines, cider, mead	Reds, fruit wines	Reds, fruit wines	Reds, rosés	Reds, whites, rosés, cider
Stage of production	Pre-fermentation, aging	Aging	Any stage	Any stage	Pre-fermentation, fermentation	Pre-fermentation, fermentation	Pre-bottling	Pre-bottling
Primary use	Superior color and aroma protection	Enhance aroma and structure	Increases tannin intensity	Increases volume	Promote color stability	Increases volume	Enhance aroma complexity	Enhance aroma complexity
Secondary use	Enhance aroma complexity	Supplement tannin profile of neutral barrels	Protects color and aromas	Protects color and aromas	Mask greenness	Protects color and aromas	Mask greenness	Improves mouthfeel balance
Source	Walnut	Grape, quebracho, oak	Tara	Gall nuts and tara	Quebracho and chestnut	Quebracho and oak	Oak	Oak
Tannin class	Hydrolyzable	Condensed and hydrolyzable	Hydrolyzable	Hydrolyzable	Condensed and hydrolyzable	Condensed and hydrolyzable	Hydrolyzable	Hydrolyzable

What are condensed tannins?

Origin

Condensed tannins, also known as proanthocyanidins, are a type of tannin found in grape skins, seeds, and stems as well as exotic woods like quebracho and acacia.

Chemical Makeup

Condensed tannins are polymerized flavonoid compounds, meaning they are made up of smaller units (flavan-3-ols) linked together.

Contribution to wine

Condensed tannins play an important role in wine mouthfeel (bitterness and astringency), aroma and color protection, and color stabilization.

What is a hydrolyzable tannin?

Origin

Hydrolyzable tannins (sometimes known as gallo or ellagic tannins) are a different type of tannin typically derived from oak, gallnuts, chestnuts, cherry wood, or tara.

Chemical Makeup

Hydrolyzable tannins are more complex and consist of a core molecule (usually glucose) with multiple tannin units attached to it.

Contribution to wine

Hydrolyzable tannins are responsible for aroma enhancement and wine structure, but can also play a role in wine oxidation and can help protect the wine from aging.

QUICK GUIDE TO CHOOSING TANNINS

RICHE	RICHE EXTRA	ROYAL	FT ROUGE BERRY	FT BLANC CITRUS	TANIN SR (FT COLORMAX)	UVA'TAN	UVA'TAN SOFT
92	92	93	93	94	94	95	95
Reds, whites, rosés	Reds, whites, rosés, cider	Whites, reds	Reds, rosés, cider	Whites, rosés, cider, mead	Reds, fruit wines	Reds, whites, rosés	Reds, whites, rosés
Aging, Pre-bottling	Aging, Pre-bottling	Pre-bottling	Any stage	Any stage	Fermentation	Any stage	Any stage
Enhance aroma complexity	Enhance aroma complexity	Enhance aroma complexity	Enhance aroma complexity	Enhance aroma complexity	Superior color stability	Enhance structure	Increases volume
Enhance mouthfeel	Enhance mouthfeel	Masks off-odors	Mask greenness	Increases volume	Increases tannin intensity	Increases tannin intensity	Enhance structure
Oak	Oak	Oak	Red berry plants	Citrus wood and gall nuts	Quebracho	Grape skins and seeds	Grape skins
Hydrolyzable	Hydrolyzable	Hydrolyzable	Condensed	Condensed and hydrolyzable	Condensed	Condensed	Condensed

What impacts the composition of tannins?

The composition of tannins is influenced by a variety of factors that can significantly alter their characteristics and behavior. These factors include:

Botanical Origin: Tannins originate from different plant sources, and this source greatly impacts their composition. Different plants produce different types of tannins, such as hydrolyzable and condensed tannins, each with unique properties.

Chemical Nature: The specific chemical structure of tannins play a crucial role in determining their characteristics. This structure is influenced by the plant's genetics and environmental conditions.

Extraction and Purification Methods: The techniques used to extract and purify tannins from their natural sources can affect their composition. Different extraction methods, such as the use of solvents (alcohol or water), temperature, and time, can lead to variations in the types and amounts of tannins extracted.

Tannin Age: Over time, tannins can undergo chemical changes, a process that can be influenced by factors like exposure to air (oxidation) or reactions with other compounds. The age of the tannin can thus impact its composition and properties. When doing bench trials or making additions to wines, make sure you are using fresh tannins.

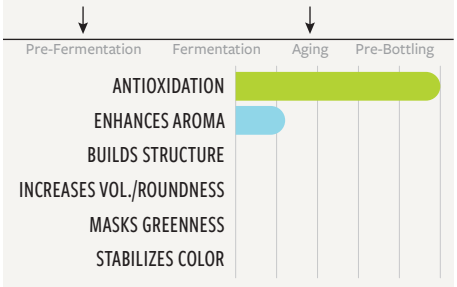
Storage Conditions: Conditions such as temperature, light, humidity, and the presence of oxygen can significantly impact the stability and composition of tannins. Proper storage is crucial to maintain their desired properties.

Presence of Interfering Compounds: Tannins can interact with other compounds, such as proteins and polysaccharides present in their environment. These interactions can alter the effective concentration, solubility, and overall behavior of tannins.

Understanding these factors is essential for effectively utilizing tannins. Each factor can contribute to the final properties of tannins, influencing their efficacy and role in winemaking.

ESSENTIAL ANTIOXIDANT

Superior oxidation protection



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

1kg – #15984

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

- Can inhibit laccase damage on *Botrytis* infected grapes
- Protects aromas and color of aromatic juices and wines that are susceptible to enzymatic browning
- Minimal impact on mouthfeel when used at low dosages
- Highly effective gallnut tannin
- Can be used pre-fermentation and/or during aging (up to 3 weeks prior to bottling)

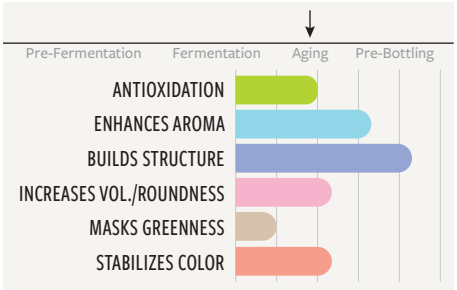
Usage: Dissolve ESSENTIAL ANTIOXIDANT in about ten times its weight of water 35–40°C (95–104°F) until fully dissolved. Add gradually during a transfer or pumpover. Good mixing is important. If an addition is made post-fermentation, we recommend waiting 3–6 weeks after the tannin addition before racking, fining, filtering, or bottling.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Once opened, the product must be used rapidly.

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

Fruit-Forward Reds

ESTATE

Enhances fruit, spice, and mid-palate



Frequently used in reds

1 kg – #15958

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

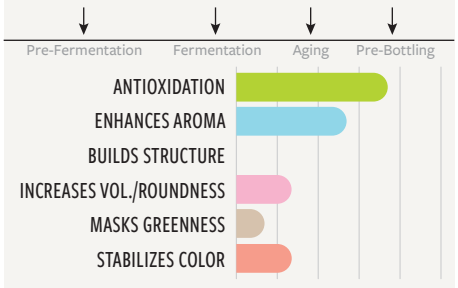
- Highlights red and dark fruit aromas and can bring out spiciness
- Can build mid-palate and enhance structure
- Can compensate for the lack of tannins in neutral barrels
- Blend of tannins from grapes, ellagic tannins from untoasted oak, and Quebracho
- Can be used pre-fermentation and/or during aging (up to 6 weeks prior to bottling)

Usage: Dissolve ESTATE in about ten times its weight of water 35–40°C (95–104°F) until fully dissolved. Add gradually during a transfer. Mix well to ensure homogeneity. Following organoleptic evaluations, 2-3 further additions can be made prior to racking. Additions should be made at least 6 weeks before bottling to allow for polymerization and settling.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

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

FT BLANC

Protection from oxidation and early protein removal



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

1 kg – #15954
5 kg – #15969

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

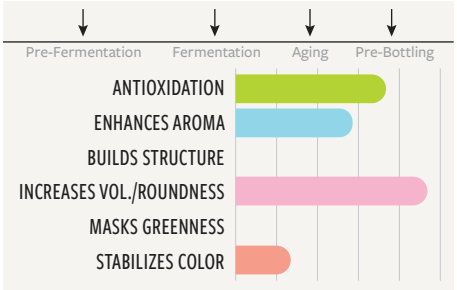
- Can contribute notes of minerality
- Can increase tannin levels in low tannin juice and wine
- Can inhibit laccase damage due to its antioxidant properties but for maximum antioxidant protection in the case of mold damage and high laccase potential, ESSENTIAL ANTIOXIDANT™ (pg 88) is the preferred tannin
- 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
- Can be used at any stage of production (up to 3 weeks prior to bottling)

Usage: Add FT BLANC by sprinkling directly on grapes at the crusher. If adding to juice or wine, dissolve in about ten times its weight of water 35–40°C (95–104°F) and add ensuring good homogenization. If an addition is made post-fermentation, we recommend waiting 3–6 weeks after the tannin addition before racking, fining, filtering or bottling.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
Juice	50-150 ppm	5-15 g/hL	0.42-1.2 lb/1000 gal
Wine	50-300 ppm	5-30 g/hL	0.42-2.5 lb/1000 gal
Fruit Wine, Cider, Mead	50-200 ppm	5-20 g/hL	0.42-1.7 lb/1000 gal

FT BLANC SOFT

Oxidation protection and mouthfeel enhancement



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

1 kg – #15955
5 kg – #15980

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

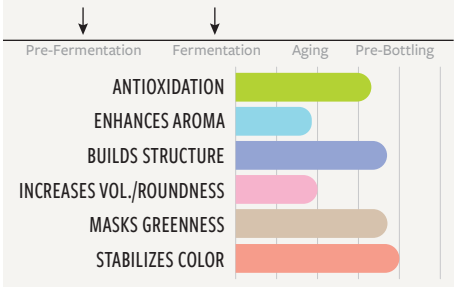
- Provides some antioxidative protection (for maximum antioxidant protection in the case of mold damage and high laccase potential, ESSENTIAL ANTIOXIDANT (pg 88) is the preferred tannin)
- Wines have enhanced texture, fuller mid-palate, and a perception of sweetness
- Relatively small dosages can contribute 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
- Can be used at any stage of production (up to 3 weeks prior to bottling)

Usage: Add FT BLANC SOFT by sprinkling directly on grapes at the crusher. If adding to juice or wine, dissolve in about ten times its weight of water 35–40°C (95–104°F) and add ensuring good homogenization. If an addition is made post fermentation, we recommend waiting 3–6 weeks after the tannin addition before racking, fining, filtering or bottling.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
Juice	50-150 ppm	5-15 g/hL	0.42-1.2 lb/1000 gal
Wine	50-300 ppm	5-30 g/hL	0.42-2.5 lb/1000 gal
Fruit Wine, Cider, Mead	20-200 ppm	2-20 g/hL	0.17-1.7 lb/1000 gal

FT ROUGE

Promotes color, structure, and fruit



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

1 kg – #15950
5 kg – #15951

SCOTT'TAN FT ROUGE™ can help preserve the grapes' natural tannins so they can bind color molecules (anthocyanins) for optimal color stability.

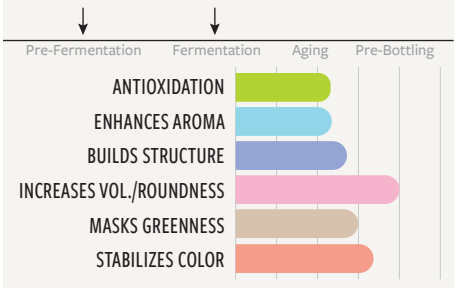
- Mouthfeel is also enhanced without adding bitterness
- Provides some antioxidative protection (for maximum antioxidant protection in the case of mold damage and high laccase potential, ESSENTIAL ANTIOXIDANT (pg 88) is the preferred tannin)
- Blend of highly reactive tannins derived from exotic woods and chestnut
- For use during fermentation

Usage: Gradually pour FT ROUGE directly on grapes at the crusher or dissolve in about ten times its weight of water 35–40°C (95–104°F) and add to the must during a pumpover. If subsequent additions are desired, this can be done in increments of 0.5 lb/1000 gal (~60 ppm) and mix thoroughly.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage			
Red Vinifera Must and Fruit Wine	200–500 ppm	20–50 g/hL	1.7–4.0 lb/1000 gal
Red Non-Vinifera Must	300–600 ppm	30–60 g/hL	2.5–5.0 lb/1000 gal

FT ROUGE SOFT

Promotes color, mouthfeel, and fruit



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

1 kg – #15952
5 kg – #15953

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
- For use during fermentation

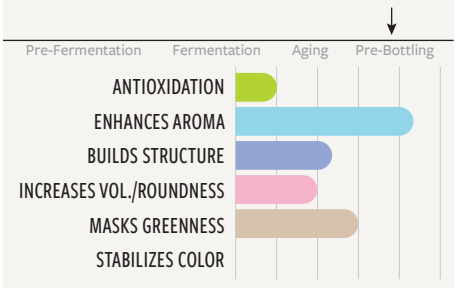
Usage: Gradually pour FT ROUGE SOFT directly on grapes at the crusher or dissolve in about ten times its weight of water 35–40°C (95–104°F) and add to the must during a pumpover. If subsequent additions are desired, this can be done in increments of 0.5 lb/1000 gal (~60 ppm) and mix thoroughly.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage			
Red Vinifera Must and Fruit Wine	200–500 ppm	20–50 g/hL	1.7–4.0 lb/1000 gal
Red Non-Vinifera Must	300–600 ppm	30–60 g/hL	2.5–5.0 lb/1000 gal

Fruit-Forward Reds

ONYX

Enhances red fruit and berry aromas, minimizes greenness



Frequently used in reds, rosés, hybrids

250 g – #15977
1 kg – #15981

SCOTT'TAN ONYX™ has complex aromatics that mimic new Medium toasted French oak and adds fine mouth-coating tannins which support volume and structure.

- Brings out berry and sweet red fruit aromas
- Can minimize green, herbaceous notes
- Rapidly integrates
- Great for "last-minute" additions - conduct filterability trials to avoid filtration challenges
- Derived from French oak
- Best used for final blend adjustments (up to 2 days prior to bottling)

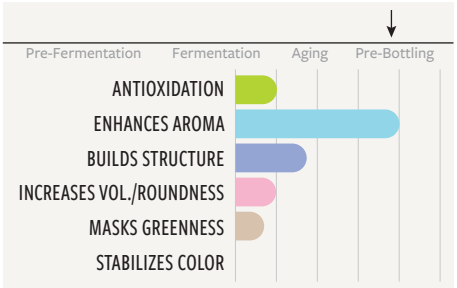
Usage: Add ONYX by mixing with 10 times its weight of water 35–40°C (95–104°F). If available, it is best to use an inline dosing pump to incorporate ONYX into the wine. If an inline dosing pump is unavailable, add product and mix well to obtain even distribution. If the wine will be filtered at bottling, add ONYX 48 hours prior to bottling to allow for proper integration.
ONYX is able to pass through final membrane filters (0.45 um) found on most bottling lines, though filtration is not required after adding ONYX.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
Wine	10-100 ppm	1-10 g/hL	0.08-0.83 lb/1000 gal

Fruit-Forward Reds

RADIANCE

Enhances freshness, reveals fruit and oak aromas



Frequently used in whites, reds, rosés, cider

250 g – #15978
1 kg – #15985

SCOTT'TAN RADIANCE™ integrates rapidly and helps to unmask and refine aromas, bringing an aromatic freshness to wines.

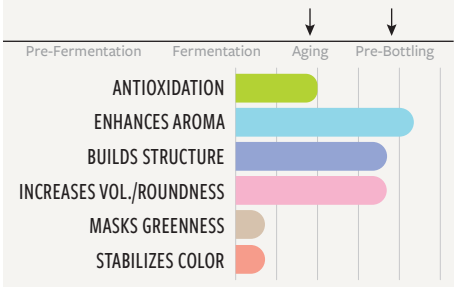
- Highlights fresh fruit, vanilla, and caramel
- Promotes balance and mouthfeel while maintaining acidity
- Rapidly integrates
- Great for "last-minute" additions - conduct filterability trials to avoid filtration challenges
- Blend of tannins from lightly toasted French oak
- Best used for final blend adjustments (up to 2 days prior to packaging)

Usage: Add RADIANCE by mixing with 10 times its weight of water 35–40°C (95–104°F). If available, it is best to use an inline dosing pump to incorporate RADIANCE into the wine. If an inline dosing pump is unavailable, add product and mix well to obtain even distribution. If the wine will be filtered at bottling, add RADIANCE 48 hours prior to bottling to allow for proper integration.
RADIANCE is able to pass through final membrane filters (0.45 um) found on most bottling lines, though final filtration is not required after adding RADIANCE.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
Wine & Cider	10-100 ppm	1-10 g/hL	0.08-0.83 lb/1000 gal

RICHE

Sweetness and finesse



Frequently used in whites, rosés, reds

500 g – #15962

SCOTT'TAN RICHE™ is notable for enhancing mouthfeel and aromatic complexity, giving a hint of sweet oak.

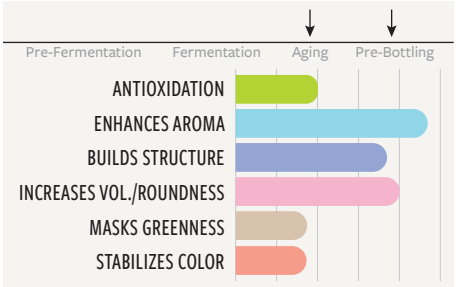
- Imparts hints of vanilla and nuttiness together with an oak sweetness
- Respectful of varietal character and adds nuanced notes without being overpowering
- Integrates quickly
- Can contribute the finishing touch to your wine
- Derived from 100% toasted French oak
- Best used during aging or prior to bottling, requires a minimum of 3 weeks for full integration

Usage: Dissolve RICHE in about 10 times its weight of 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. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
White/Rosé Wine	30-100 ppm	3-10 g/hL	0.25-0.83 lb/1000 gal
Red Wine	30-200 ppm	3-20 g/hL	0.25-1.7 lb/1000 gal

RICHE EXTRA

Smoothness and richness



Frequently used in reds, rosés, whites, hybrids, cider

500 g – #15963

SCOTT'TAN RICHE EXTRA™ enhances aromatic complexity and adds richness to the palate.

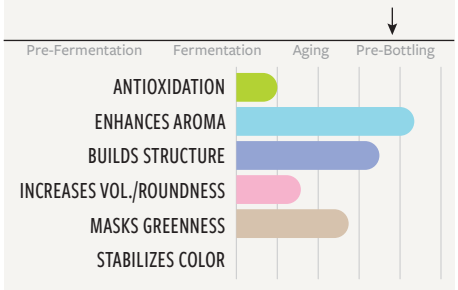
- Heightens the perception of vanilla and coconut
- Can help build mid-palate structure and a smooth finish
- It can contribute the finishing touch to your wine
- Integrates quickly
- Derived from 100% toasted American oak
- Best used during aging or prior to bottling, requires a minimum of 3 weeks for full integration

Usage: Dissolve RICHE EXTRA in about 10 times its weight of 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. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
White/Rosé Wine & Cider	30-100 ppm	3-10 g/hL	0.25-0.83 lb/1000 gal
Red Wine	30-200 ppm	3-20 g/hL	0.25-1.7 lb/1000 gal

ROYAL

Increases structure, enhances aromatic complexity and masks off odors



Frequently used in whites, reds, cider

250 g – #15979
1 kg – #15986

SCOTT'TAN ROYAL™ has complex aromatics that mimic new Medium toasted American oak and adds fine, silky tannins which build structure and finesse.

- It is known to bring out aromas of mocha, coconut, and butterscotch
- Can help mask *Brettanomyces* off-aromas and flavors
- Rapidly integrates
- Great for "last-minute" additions - conduct filterability trials to avoid filtration challenges
- Derived from American oak
- Best used for final blend adjustments (up to 2 days prior to bottling)

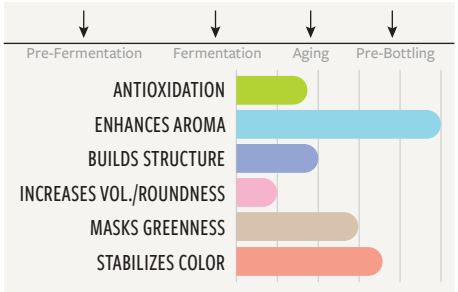
Usage: Add ROYAL by mixing with 10 times its weight of water 35–40°C (95–104°F). If available, it is best to use an inline dosing pump to incorporate ROYAL into the wine. If an inline dosing pump is unavailable, add product and mix well to obtain even distribution. If the wine will be filtered at bottling, add ROYAL 48 hours prior to bottling to allow for proper integration.
ROYAL is able to pass through final membrane filters (0.45 um) found on most bottling lines, though filtration is not required after adding ROYAL.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
Wine & Cider	10-100 ppm	1-10 g/hL	0.08-0.83 lb/1000 gal

Fruit-Forward Reds

FT ROUGE BERRY

Enhances red berry fruit aromas, diminishes vegetative notes



Frequently used in reds, rosés, cider

1 kg – #15972
5 kg – #15973

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

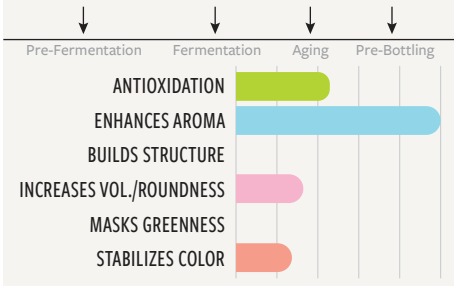
- Enhances strawberry, cherry, and blueberry aromas
- Aromas are greater when FT ROUGE BERRY is used during fermentation and in conjunction with a yeast strain with ß-glycosidase activity (see pgs 18-19 and look for yeast identified as enhancing varietal characters)
- Masks green/vegetative notes
- Blend of condensed tannins from red berry plants
- Can be used at any stage of production (up to 3 weeks prior to bottling)

Usage: Dissolve FT ROUGE BERRY in about 10 times its weight of 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. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
Rosé Must & Cider	20-150 ppm	2-15 g/hL	0.17-1.2 lb/1000 gal
Red Must & Wine	50-200 ppm	5-20 g/hL	0.42-1.7 lb/1000 gal

FT BLANC CITRUS

Enhances fruity and floral aromas



Frequently used in whites, rosés, cider, mead

1 kg – #15974
5 kg – #15975

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 ß-glycosidase activity (see pgs 16-17 and look for yeast identified as enhancing varietal characters)
- 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
- Provides some antioxidative protection (for maximum antioxidant protection ESSENTIAL ANTIOXIDANT (pg 88) is the preferred tannin)
- Blend of tannins from citrus wood and gallnuts
- Can be used at any stage of production (up to 3 weeks prior to bottling)

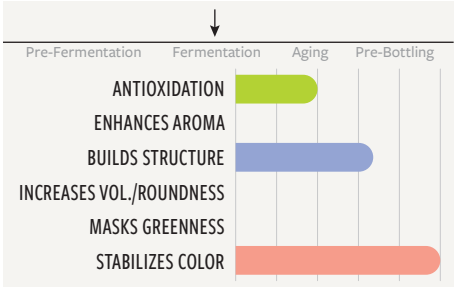
Usage: Dissolve FT BLANC CITRUS in about 10 times its weight of water 35–40°C (95–104°F) then add it to the juice/wine and mix well. If using during alcoholic fermentation add 24–48 hours after yeast inoculation. Final additions should be made at least 3 weeks prior to bottling.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
Juice, Cider, Mead	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

TANIN SR

(Formerly FT COLORMAX)

Promotes color stability



Frequently used in reds, fruit wines

1 kg – #15968

TANIN SR™ is an extract of concentrated catechin tannins and when added during maceration it helps to stabilize color and improve structure

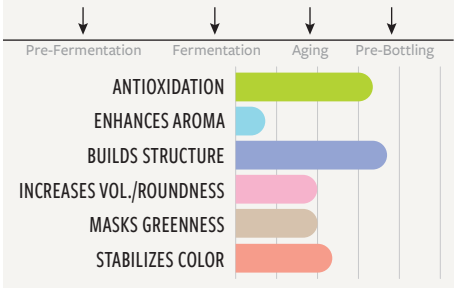
- Its special formulation goes into solution easily
- It is intended for use in conjunction with FT ROUGE or FT ROUGE SOFT (pgs 90).
- Catechin from exotic woods
- For use during fermentation

Usage: Dissolve TANIN SR in about ten times its weight of water 35–40°C (95–104°F) and add at 1/3 sugar depletion during alcoholic fermentation, ensuring good homogenization. If a cold soak has been done, add TANIN SR during the first mixing. If a cold soak has been done, add TANIN SR during the first mixing.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

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

UVA'TAN

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



Frequently used in reds, whites, rosés

500 g – #15964

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.

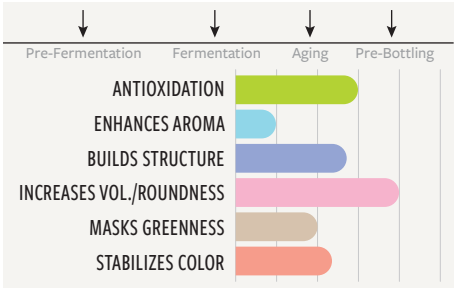
- UVA'TAN can compensate for tannin deficiency in vintages when grape tannin content is low, seeds are unripe, or in cases where overripe grapes were watered-back
- UVA'TAN assists with oak tannin integration when used during barrel aging
- It is high in polyphenols but low in astringency
- Additions should be made at least six weeks before bottling, though smaller additions closer to bottling can still be beneficial. Conduct filterability trials to avoid filtration challenges
- Composed of grape seed and grape skin tannins
- Can be used at any stage of production (up to 6 weeks prior to bottling)

Usage: Add UVA'TAN by sprinkling directly on grapes at the crusher. If adding to juice or wine, dissolve in about ten times its weight of water 35–40°C (95–104°F) and add ensuring good homogenization. Final additions can be made up to three weeks before bottling, though six weeks are recommended for more complete polymerization, settling, and optimal filtration.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
Red Must	50–400 ppm	5–40 g/hL	0.42–3.3 lb/1000 gal
White Wine	50–150 ppm	5–15 g/hL	0.42–1.2 lb/1000 gal
Rosé Wine	50–200 ppm	5–20 g/hL	0.42–1.7 lb/1000 gal
Red Wine	50–300 ppm	5–30 g/hL	0.42–2.5 lb/1000 gal

UVA'TAN SOFT

Grape skin tannin for mouthfeel enhancement and balancing oak



Frequently used in reds, whites, rosés

500 g – #15965

SCOTT'TAN UVA'TAN SOFT™ positively impacts mouthfeel, increasing roundness and softness without imparting bitterness.

- Useful when grapes' native tannins are deficient and mouthfeel is lacking
- Assists with the integration of oak tannins during barrel aging
- At low dosages, can optimize the aging potential of white and rosé wines
- Can be used at all stages of winemaking
- Additions should be made at least six weeks before bottling, though smaller additions closer to bottling can still be beneficial. Conduct filterability trials to avoid filtration challenges
- Highly reactive tannins prepared from freshly pressed white grape skins
- Can be used at any stage of production (up to 6 weeks prior to bottling)

Usage: Add UVA'TAN SOFT by sprinkling directly on grapes at the crusher. If adding to juice or wine, dissolve in about ten times its weight of water 35–40°C (95–104°F) and add ensuring good homogenization. Final additions can be made up to three weeks before bottling, though six weeks are recommended for more complete polymerization, settling, and optimal filtration.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for wine			
Red Must	50–400 ppm	5–40 g/hL	0.42–3.3 lb/1000 gal
White Wine	50–150 ppm	5–15 g/hL	0.42–1.2 lb/1000 gal
Rosé Wine	50–200 ppm	5–20 g/hL	0.42–1.7 lb/1000 gal
Red Wine	50–300 ppm	5–30 g/hL	0.42–2.5 lb/1000 gal

**Please see scottlab.com for current pricing. For a complete price list of all items in this book, see scottlab.com/order-planner.*

STAVIN & THERMIC OAK INFUSION PRODUCTS

StaVin Flavor Profiles

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

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

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

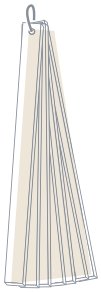
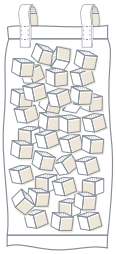
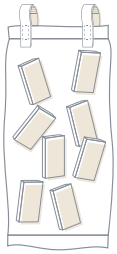
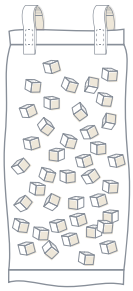
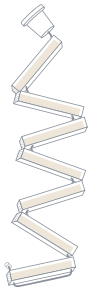
THERMIC Flavor Profiles

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

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

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

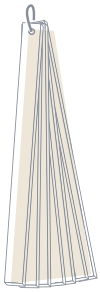
Oak Infusion Product Formats

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

FOR USE IN TANK

FAN PACKS

Slow release of oak compounds for use in tanks



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

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

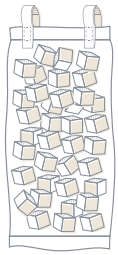
THERMIC FAN PACKS
Size: 36” x 17/16” x 13/16”; 20 sq ft; 15 lb
Oak Source: American (*Quercus alba*)
Color 1 Fan Pack – Item #KB2110
Color 2 Fan Pack – Item #KB2120
Color 3 Fan Pack – Item #KB2130
Color 4 Fan Pack – Item #KB2140
Color 5 Fan Pack – Item #KB2150

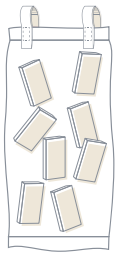
STAVIN FAN PACKS
Size: 36” x 1.5-2.5” x 3/8”; 44 sq ft
Oak Source: French (*Quercus petraea, Q. robur*)
Med Fan Pack – Item #ST2260F44
Med+ Fan Pack – Item #ST2270F44
Savour Fan Pack – Item #ST2361F44
Savour DM Fan Pack – Item #ST2371F44

CUBES & SEGMENTS

thermic

Fast release of oak compounds for use in tanks





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

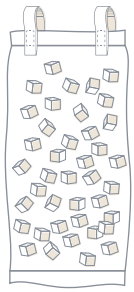
- Can be used during fermentation, aging, and finishing
- Designed for fast-to-market wines
- Suggested contact time of 3-18 months. Wine should be frequently tasted and evaluated to determine the exact contact time
- Oak cubes are packaged in food grade mesh bags. The bags have rugged handles to allow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

THERMIC OAK CUBES
Size: 1" x 1 1/16" x 13/16"; 20lb bag
Oak Source: American (*Quercus alba*)
Color 1 Cubes – Item #KB3110
Color 2 Cubes – Item #KB3120
Color 3 Cubes – Item #KB3130
Color 4 Cubes – Item #KB3140
Color 5 Cubes – Item #KB3150

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

MINI CUBES

Very fast release of oak compounds for use in tanks



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

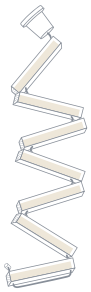
- Can be used in tank during fermentation, aging, and finishing
- Can be used in barrels using our infusion tube (see pg 99)
- Designed for fast-to-market wines
- Suggested contact time of 2-12 months. Wine should be frequently tasted and evaluated to determine the exact contact time
- Mini cubes are packaged in food grade mesh bags. The bags have rugged handles to allow for easy tank installation and removal
- **Available in fire toast only**

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

FOR USE IN BARRELS

BARREL INSERTS

Slow release of oak compounds for use in barrels



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

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

THERMIC BARREL INSERTS
Size: 9" x 17/16" x 13/16"; 20 sections; 3.5 lb
Oak Source: American (*Quercus alba*)
Color 1 Insert – Item #KB4110
Color 2 Insert – Item #KB4120
Color 3 Insert – Item #KB4130
Color 4 Insert – Item #KB4140
Color 5 Insert – Item #KB4150

STAVIN BARREL INSERTS
Size: 17.5"x ± 1"x ± 3/8"; 10 sections of 3 staves
Oak Source: French (*Quercus petraea, Q. robur*)
Med Insert – Item #ST4260F10
Med+ Insert – Item #ST4270F10
Savour Insert – Item #ST4361F10
Savour DM Insert – Item #ST4371F10

INFUSION TUBE

for use with MINI CUBES

Fast release of oak compounds for use in barrels

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

- Used during fermentation, aging, and finishing
- While extraction happens quickly, intensity of oak flavors and aromas is limited by the amount of oak able to fit in the tube; this format is designed to mimic 30% of the intensity of a new oak barrel
- Suggested contact time of 2-12 months. Wine should be frequently tasted and evaluated to determine the exact contact time
- Infusion tubes and cubes are sold separately; Mini cubes are sold in 8 oz packs for use with the infusion tube (for 20 lb bags, see pg 98)
- **Available in fire toast only**

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

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

ARTICLE

HOW TO CHOOSE AND USE OAK INFUSION PRODUCTS IN BARREL

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

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

CHOOSING AN OAK INFUSION PRODUCT

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

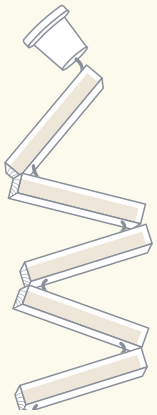
Flavor profile:

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

Flavor profile is affected by wood origin, toasting method, and toast level. We've created some helpful charts on pgs 96-97 that outline the flavor profiles and common uses of the oak infusion products in our portfolio. With experience, it will become easier to determine which products will produce the desired wine style.

Format (size & shape of oak):

Barrel Inserts



Infusion Tubes with Mini Cubes

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

WHEN DO YOU ADD OAK INFUSION PRODUCTS TO BARREL?

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

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

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

CAN YOU REUSE OAK INFUSION PRODUCTS?

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

STILL HAVE QUESTIONS ABOUT GETTING STARTED WITH THESE PRODUCTS?

Give us a call to connect with a technical specialist!

FEELWOOD! BALANCE & STRUCTURE

IOC

Boosts ripe fruit, masks vegetative characteristics

Frequently used in whites, rosés, reds

10 kg (2 x 5 kg units, 2 infusion bags) – #15942

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

- Herbaceous notes are minimized while fruit aromatics are amplified
- Volume and mid-palate sweetness are enhanced
- 100% French oak chips are a blend of toast levels (untoasted, light, medium)
- Aged for 24 months
- 2 x 5 kg infusion bags are included

Usage: For whites and rosés, chips must be used with infusion bags (2 x 5 kg infusion bags are included). 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
Red	1-3 g/L	100-300 g/hL	8.3-25 lb/1000 gal

FEELWOOD! SWEET & FRESH

IOC

Enhances fruit profile, sweetness, and length

Frequently used in whites, rosés, reds

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

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
- 2 x 5 kg infusion bags are included

Usage: For whites and rosés, chips must be used with infusion bags (2 x 5 kg infusion bags are included). 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
Red	1-3 g/L	100-300 g/hL	8.3-25 lb/1000 gal

ADDITIONAL RESOURCES

Please scan the codes below or visit our website to view our bench trial protocol and wine finishing kit.

Bench Trial Protocol
scottlab.com/bench

Finishing Kit
scottlab.com/finishing-kit

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 the specialized and nuanced activities of these biological tools and know that they help make processing easier at all stages of winemaking. We are committed to sharing the benefits of enzymes with producers of any size, so we offer a variety of package sizes and formats.

At almost every stage of the winemaking process proper enzyme use can improve quality, save costs, and help avoid downstream challenges.

Enzymes are present in all plants, animals, and microbes, including grapes, yeast, and bacteria, and are responsible for catalyzing a variety of reactions that would otherwise occur more slowly. While enzymes are naturally present in grapes, juice, and wine, their activity is limited by fermentation and wine conditions. Enological enzymes can be added to compensate for this lack of activity. Enological enzymes are purified from fungi, including *Aspergillus niger* and *Trichoderma harzianum*.

In winemaking, the main function of enological enzymes is to break down pectin and other structural polysaccharides. Pectin is a complex and large molecule that, if left in its native form, can cause clarification and filtration challenges. However, enzymes can do so much more than that:

BENEFITS OF ENZYMES IN JUICE AND WINE

IMPROVE CLARIFICATION AND FILTRATION	Scott Laboratories likes to think of clarification and filtration as "dance partners," as proper clarification will make filtration easier. Enzymes will increase the efficiency of both processes: • Enzymes will increase the efficiency of clarification practices at all stages of winemaking by breaking down pectin that traps solids in suspension. This also allows fining agents to more efficiently bind and remove target compounds. • Enzymes help break down glucans and other polysaccharides that cause filtration challenges.
INCREASE YIELDS	Using enzymes will help increase yields. Enzymes will break down pectin in grape pulp thereby releasing trapped juice and decreasing solids. This allows more high 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 released 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 111) 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 enological enzyme activity, add 5-10 g/hL bentonite.

Winemaking Enzymes 101

WHAT ARE ENZYMES?

Most enological enzymes are specialized enzymes derived from fungi, including *Aspergillus niger* and *Trichoderma harzianum*. Enzymes are present in all plants, animals, and microbes, including grapes, yeast, and bacteria, and are responsible for accelerating a variety of reactions. While enzymes are naturally present in grapes, juice, and wine, their activity is limited by fermentation and wine conditions. Enological enzymes can be added to compensate for this lack of activity.

The organism used to produce them, the substrates during production, and the specific formulation all influence what a certain enological enzyme can do in wine.

WHAT DO ENZYMES DO?

In winemaking, the main function of enological enzymes is to break down pectin and structural polysaccharides, and release sugar-bound aromas.

Break down pectin and structural polysaccharides

Enzymes can break down complex polysaccharides from the grape (skins and pulp), yeast, and other microorganisms. Breaking down these compounds:

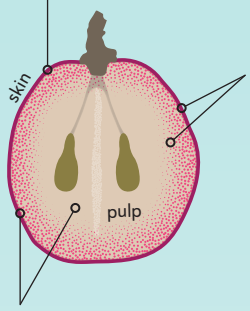
- **Releases desirable components** such as juice, aroma precursors, color compounds, and texture compounds (tannins and polysaccharides).
- **Prevents processing issues** such as slow filtrations and difficulties with clarification.

Release sugar-bound aromas

Many varietal aromas from grapes are released into juice/must bound to sugars (both fermentable and non-fermentable) and in this form the aroma compounds are odorless. Specific enzymes can cleave aroma compounds from sugars, converting them to an odor-active form and **increasing varietal aroma**.

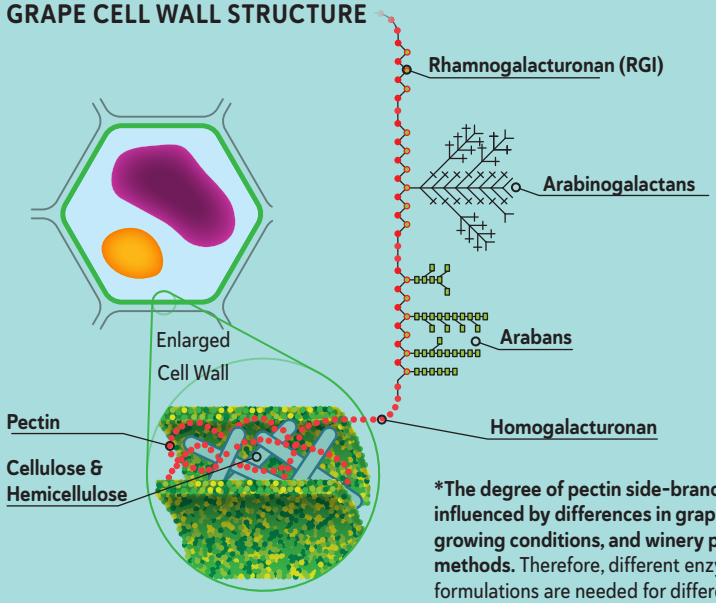
UNDERSTANDING GRAPE BERRY STRUCTURE

Cellulose and hemicellulose are structural polysaccharides located in the skin that can trap aroma precursors and color pigments. They can also make it more difficult to release juice during pressing.



Varietal aroma precursors are found bound to amino acids and sugars located in the skins and pulp. When bound, these aromas are odorless.

Pectins are a complex structural polysaccharide located in the skin and pulp. If they are not broken down with enzymes, pectins can make it more difficult to release juice during pressing, keep solids in suspension (slowing down settling), and can foul filter media (reducing flow rates).



***The degree of pectin side-branching is influenced by differences in grape varietals, growing conditions, and winery processing methods.** Therefore, different enzyme formulations are needed for different winemaking applications and scenarios.

Glucans are introduced to wine from yeasts or *Botrytis* infected grapes. Depending on the type of glucan present they can have different impacts. In yeast, glucans are a structural polysaccharide found in the cell's walls. After hydrolysis, glucans are released into the wine where they can influence wine mouthfeel and complex with tannins. Glucans from *Botrytis* infected grapes can cause settling and filtration issues.

FOCUS: Understanding Pectin Structure

Pectins can be extremely complex and difficult to break down due to a phenomenon known as "branching". **All pectins have a main polysaccharide chain** composed of homogalacturonan sub-units. **These main chains can also have varying degrees of side-branching*** of additional polysaccharides called rhamnogalacturonans, arabinans, and arabinogalactans (see figure above). **Enzymes that break down pectin can specialize in breaking down the main chain or they may be able to break down the main chain and some of the pectin side chains.**

UNDERSTANDING ENZYME ACTIVITY

Enzyme activity is a term that can be used to describe what an enzyme targets, which determines the enzyme's application. There are a few major categories of enological enzyme activity (see table below).

Enzymatic activities			Winemaking Application / Goal									
			Increase Yields		Flotation	Static Settling	Increase Extraction of Aroma precursors	Increase Extraction of Color pigments and tannins	Improve Filterability	Improve Roundness	Release Sugar Bound Aromas
			Whites	Reds	Whites	Whites	Whites/ Reds	Reds	Whites/ Reds	Whites/ Reds	Whites/ Reds
Pectinases	Main chain activities	Polygalac-turonase (PG) Pectin Methyl Esterase (PME)	♦♦	♦♦	♦♦	♦♦♦			♦♦♦		
		Pectin Lyase (PL)			♦♦♦	♦					
	Side chain activities	Rhamnogalac-turonase (RGI)		♦♦					♦♦		
		Arabinanase	♦♦	♦♦		♦♦♦			♦♦♦		
Cellulases	Endo - (1,4) - β -D- Glucanase Exo - (1,4) - β -D- Glucanase		♦	♦			♦	♦♦♦			
Hemicellulases	Xylanase, Galactomananase		♦♦	♦♦			♦♦	♦♦♦			
Glucanases	Exo - (1,3) (1,6) - β -D- Glucanases								♦♦♦	♦♦♦	
Glycosidases	β -D- Glucosidase α -L- Arabinofuranosidase ααα L- Rhamnosidase β -L- Apiosidase										♦♦♦

♦ In this chart, categories of enzyme activities are rated on a scale from ♦ to ♦♦♦, where ♦♦♦ indicates more of that activity is needed for that winemaking application/goal.

ENZYMES ARE BLENDS OF ACTIVITIES

Enological enzymes are blends of different activities discussed in the table above**. **Enzymes are formulated with precise blends of activities to achieve a specific goal.**

Even if two enzymes contain a similar blend of activities, the **concentrations** and **ratios** of activities **can differ** which may change the application. For example, enzymes that are used to increase extraction of skin-trapped compounds (aromas in whites, color and tannin in reds) have similar blends of activities – primarily cellulose and hemicellulose activity. However, the enzymes formulated for extracting color and tannin from red grapes have higher concentrations of both activities than enzymes formulated for extracting aroma precursors from white grapes. **The enzymes formulated for white grapes are less concentrated to minimize the extraction of undesirable phenolics.** This emphasizes the importance of the ratio between activities in a given enzyme formulation.

Enzymes are much like active dry yeast – with yeast, we have come to accept and appreciate that small genetic differences between strains can make a big impact. It's the same with enzymes - **small differences in the composition, concentration, and ratios of activities can change the usage and impact entirely.** Throughout this section, check the "frequently used in" boxes for the most appropriate applications of each enzyme.

***All enological enzymes are pectinase-based and contain some amount of pectinase activity.*

QUICK GUIDE TO CHOOSING ENZYMES

	LALLZYME CUVEE BLANC	RAPIDASE EXPRESSION AROMA	RAPIDASE REVELATION AROMA	LALLZYME EX	LALLZYME EX-V	SCOTTZYME COLOR PRO
Pg	108	109	110	108	108	111
	Aroma Release			Maceration		
Primary Use	Extracts skin-trapped varietal aroma compounds	Extracts skin-trapped varietal aroma compounds	Releases sugar bound aroma compounds	Higher yield at lower pressing pressures (smaller hard press fraction)	Higher yield at lower pressing pressures (smaller hard press fraction)	Higher yield at lower pressing pressures (smaller hard press fraction)
Secondary Uses	Higher yield at lower pressing pressures (smaller hard press fraction) Continued aroma release during fermentation	Higher yield at lower pressing pressures (smaller hard press fraction)	Clarification	Releases color molecules	Enhances structure Releases color molecules	Masks greenness Releases color molecules
Stage of Production	Grapes/in press (white, rosé)	Grapes (white, rosé)	Wine (all wines)	Grapes/must (red)	Grapes/must (red)	Grapes/must (red)
Formulation	Pectinase with glycosidase activity	Pectinase with essential side activities and hemicellulase activity	Pectinase with glycosidase activity	Pectinase with cellulase and hemicellulase activities	Pectinase with cellulase and hemicellulase activities	Pectinase with protease activity
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 components, concentrations, and ratios can 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	RAPIDASE EXTRA PRESS NEW	SCOTTZYME CINN-FREE	SCOTTZYME HC	SCOTTZYME KS	LALLZYME MMX	SCOTTZYME PEC5L	SCOTTZYME SPECTRUM
109	110	110	111	112	109	112	113
Pressing, Clarification, Fining, and Filtration improvement							
Rapid clarification under difficult conditions	Increases juice yields and minimizes time in press	Aids in pressing	Clarification in American, hybrid, and non-grape wines	Filtration	Yeast autolysis	Clarification	Filtration
Lees compaction	Increased extraction of aromatic precursors	Extraction of aromatic precursors	Filtration	Clarification under difficult conditions	Filtration	Improves pre and post-fermentation processes	Clarification under difficult conditions
Juice (white, rosé)	Grapes/in press (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 with essential side activities	Pectinase with essential side activities	Pectinase	Pectinase with cellulase activities	Pectinase with cellulase, hemicellulase, and protease activities	Pectinase with glucanase activity	Pectinase with main and side chain activities	Pectinase with cellulase, hemicellulase, and protease activities
Granular	Liquid	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

100 g – #16203

LALLZYME CUVÉE BLANC™ releases varietal aromas (thiols and terpenes) trapped in the grape skins, improves juice yield, and aids in clarification.

- Increased tropical fruit, citrus, and floral aromas and can increase grassy thiols, depending on levels in the grapes
- Enzyme is active from 5-12°C (41-53°F)
- Recommended skin contact time 2-12 hours
- Pectinase with ß-glycosidase side-activities (ß-glycosidase activity will be inhibited at the beginning of fermentation due to the high glucose concentration; enzyme activity will begin once glucose is < 50 g/L)
- Enzyme activity will be deactivated by settling or fermenting on 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

LALLZYME EX

Maceration enzyme for fresh and fruit-forward reds

Add to: Red grapes

Impact: Increases yields, releases color molecules

Format: Granular

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

100 g – #16204
250 g – #16205

LALLZYME EX™ increases extraction of aroma precursors and color compounds, and results in a balanced tannin profile.

- Early release of color
- Progressive release 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

LALLZYME EX-V

Maceration enzyme for structured and tannin-forward reds

Add to: Red grapes

Impact: Increases yields, releases color molecules, enhances structure

Format: Granular

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

100 g – #16206
500 g – #16208

LALLZYME EX-V™ increases extraction of tannin and color compounds, contributing to structured mouthfeel and stable color.

- 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

LALLZYME MMX

Breaks 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

100 g – #16207

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*

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	76-114 g/1000 gal
Red wine	4-5 g/hL	40-50 ppm	150-191 g/1000 gal
White/Rosé wine	2-3 g/hL	20-30 ppm	76-114 g/1000 gal

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 hybrids, cider, low-temperature juice

100 g – #16257

RAPIDASE CLEAR EXTREME™ quickly clarifies juice, especially in difficult conditions (low temperature, low pH, hard-to-settle varieties).

- Can be used during flotation
- Results in compact lees
- Preserves juice aromatic freshness
- Enzyme is active from 6–50°C (43–122°F)
- Recommended minimum 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 39–45°F (4–8°C). Once rehydrated, use within a few hours.

Recommended Dosage		
Juice	1-4 g/hL	38-152 g/1000 gal

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, other aromatic thiol-containing whites, rosés

100 g – #16260

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 skin 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

NEW

RAPIDASE EXTRA PRESS

Skin contact enzyme for aroma release, juice extraction, and clarification

Add to: White grapes, red grapes that are being used for rosé

Impact: Increases yields, extracts skin-trapped varietal compounds

Format: Liquid

Frequently used in aromatic whites, rosés

1 kg (890 mL) – #16244
20 kg (17.8 L) – #16254

RAPIDASE EXTRA PRESS is a skin contact enzyme that breaks down grape skins and pulp. It increases juice yields, allows for softer and shorter pressing cycles, increases extraction of aromatic precursors, and makes post-pressing clarification more efficient.

- Reduces the risk of oxidative damage by minimizing time in the press
- Reduces extraction of bitter phenolics by allowing for softer and shorter pressing
- Add as early as possible to grapes upon receipt
- Active from 10 to 45°C (50 to 113°F)
- Pectinase with essential side activities

Usage: Dilute RAPIDASE EXTRA PRESS to approximately a 10% solution in cool water. Pour the solution over grapes prior to pressing or add directly in to the press.
Storage: Dated expiration. Store refrigerated at 39–45°F (4–8°C). Once rehydrated, use within a few hours.

Recommended Dosage	
Crushed or Whole Grapes	20-30 mL/ton

Fruit-Forward Reds

RAPIDASE REVELATION AROMA

Post-fermentation enzyme to increase fruity and floral aromas

Add to: White or rosé wines

Impact: Releases sugar bound aroma compounds, clarification

Format: Granular

Frequently used in Muscat, Riesling, Gewürztraminer, rosés of Syrah, other terpene containing grapes

100 g – #16266

RAPIDASE REVELATION AROMA™ is used post-fermentation to increase varietal-based fruity and floral aromas.

- Releases bound terpenes for intense and complex fruity and floral aromas, but 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 (halt enzyme action with a 5-10g/hL bentonite addition)
- Pectinase with α- and β-glycosidase side activities (glycosidase activity is inhibited by glucose >50 g/L, this enzyme is best used post-fermentation)

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		
White/Rosé Wine	1-2 g/hL	35-70 g/1000 gal
Red Wine	2-2.5 g/hL	70-90 g/1000 gal

SCOTTZYME CINN-FREE

Pressing enzyme for white and rosé juice

Add to: Press or pressed juice

Impact: Aids in pressing and settling, extracts skin trapped varietal compounds

Format: Liquid

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

1 kg (890 mL) – #16175
25 kg (22.25 L) – #16165

SCOTTZYME CINN-FREE™ is a gentle general pectinase great for use in low-solid content juice and normal winemaking conditions.

- 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
- In juice, use during settling until desired level of clarity is achieved. Optimal contact time is 3 days at 15°C (60°F). In cases when the tank temperature is cooler (-1-15°C/30-60°F), contact time should be 4-7 days and stirring is recommended
- Purified pectinase with very low cinnamyl esterase activity

Usage: Dilute SCOTTZYME CINN-FREE to approximately a 10% solution in cool water. Pour over the grapes before pressing or add to juice before the start of alcoholic fermentation.
Storage: Dated expiration. Store at 4°C (39°F). 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

Fruit-Forward Reds

SCOTTZYME COLOR PRO

Macerating enzyme for increasing tannin profile, color stability, and reducing "veggie" character

Add to: Grapes, red must

Impact: Increases yield, releases color molecules, masks greeness

Format: Liquid

Frequently used in reds

1 kg (890 mL) – #16172
25 kg (22.25 L) – #16162

SCOTTZYME COLOR PRO™ is a gentle macerating enzyme that increases yield and extraction of color and structure compounds.

- Wines made using COLOR PRO appear to have deeper, darker, and more intense color
- Gentle extraction of tannins positively impacts wine structure
- Herbaceous and veggie characters are minimized
- Improved clarity, yield, and filterability
- Add early to crushed grapes or to must during a pumpover
- 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: Dated expiration. Store at 4°C (39°F). Keep tightly sealed and refrigerated once opened.

Recommended Dosage	
Crushed Grapes	60-100 mL/ton

SCOTTZYME HC

All-purpose enzyme for increasing yield, clarity, and filterability

Add to: Grapes, juice, or wine

Impact: Clarification in American, hybrid, and non-grape wines

Format: Liquid

Frequently used in Concord, Muscadine, Norton, hybrids, fruit wines, cider

1 kg (890 mL) – #16171
25 kg (22.25 L) – #16161

SCOTTZYME HC™ is a versatile enzyme that can be used throughout the fermented beverage process where it can increase yield, reduce solids, and improve filtration processes.

- Extremely beneficial for hard-to-press or slimy grapes (such as Concord), pome fruit (apple or pear), and stone (pitted) fruits
- HC is best used in conjunction with SCOTTZYME PEC 5L™
- In juice, use during settling until desired level of clarity is achieved. In wine, optimal contact time is 3 days at 15°C (60°F) and 4-7 days (with stirring) at -1-15°C (30-60°F).
- Pectinase with cellulase side activities

Usage: Dilute SCOTTZYME HC to approximately a 10% solution in cool water. Pour the solution over the crushed fruit or add to juice or wine during a tank mixing.
Storage: Dated expiration. Store at 4°C (39°F). 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

DID YOU KNOW?

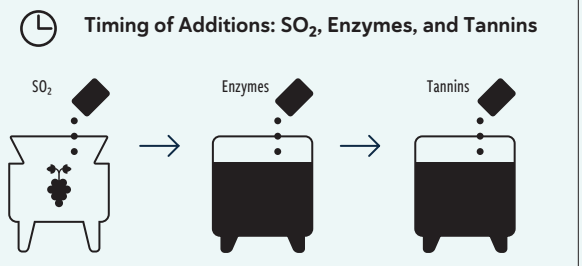
HOW TO USE ENZYMES WITH OTHER PRODUCTS

(SO_2, TANNINS, BENTONITE)

Sulfur Dioxide (SO_2): Enzymes are inhibited by SO_2. Deactivation occurs around 500 ppm. Do not add SO_2 and enzymes together. It is okay to add enzymes after the SO_2 is adequately dispersed or vice versa.

Tannins: If added together, tannins and enzymes may deactivate each other. It is okay to add tannins after the enzymes are adequately dispersed or vice versa.

Bentonite: Wait until the juice or wine has been racked off the bentonite to add enzymes. Bentonite inactivates enzymes. It is best to use bentonite after the enzyme treatment is complete.



SCOTTZYME KS

Clarification enzyme for improved settling and filterability in 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

1 kg (890 mL) – #16174
25 kg (22.25 L) – #16164

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
- In juice use during settling until desired level of clarity is achieved. In wine, optimal contact time is 3 days at 15°C (60°F) and 4-7 days (with stirring) at -1-15°C (30-60°F).
- Blend of pectinase enzymes with cellulase, hemicellulase, and protease side activities
- For very difficult to filter beverages, use SCOTTZYME SPECTRUM™

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: Dated expiration. Store at 4°C (39°F). 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

SCOTTZYME PEC5L

Pressing enzyme for improved pressing, clarification, and settling

Add to: Grapes (white or rosé), juice (white or rosé), or wine (all wines)

Impact: Clarification

Format: Liquid

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

1 kg (890 mL) – #16170
25 kg (22.25 L) – #16160

SCOTTZYME PEC 5L™ is a versatile enzyme that can be used at many winemaking stages.

- Use on crushed grapes for enhanced pressing and increased yields
- When added to juice improves settling and clarification
- When added post-fermentation improves processing including filtration
- Also useful for berries, pome, and stone fruits and should be used in conjunction with SCOTTZYME HC™
- In juice, use during settling until desired level of clarity is achieved. In wine, optimal contact time is 3 days at 15°C (60°F) and 4-7 days (with stirring) at -1-15°C (30-60°F).
- Highly concentrated pectinase

Usage: Dilute SCOTTZYME PEC 5L 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: Dated expiration. Store at 4°C (39°F). 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

SCOTTZYME SPECTRUM

Concentrated formulation, 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

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

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
- SPECTRUM should be used on finished wine or cider only, either to assist with settling or to help with filtration issues before bottling
- Post-fermentation, optimal contact time is 3 days at 15°C (60°F) and 4-7 days (with stirring) at -1-15°C (30-60°F).
- See scottlab.com for a protocol on cleaning cartridge and crossflow membranes with SCOTTZYME SPECTRUM

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: Dated expiration. Store at 4°C (39°F). Keep tightly sealed and refrigerated once opened.

Recommended Dosage - Bench trials recommended		
Fruit	Not recommended	
Juice	Not recommended	
Wine	4 mL/hL	150 mL/1000 gal

DID YOU KNOW?

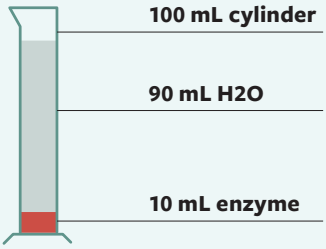
HOW TO ADD ENZYMES (liquid or granular)

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



For example, to dose one ton of grapes with a 10 mL/ton dosage, mix 10mL of liquid enzyme with approximately 90 mL of water.

For granular enzymes: Granular enzymes need to be dissolved in 10 times their weight of water (for every gram of enzyme dissolve in approximately 10 mL water), gently stir 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.

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.

Fining products bind with unwanted elements and physically **remove** them from juice and wine. **Stability products** react with substances to **prevent** wine hazes and precipitates from occurring. A properly fined, stabilized, and filtered wine makes for a bottle-stable wine.

BENEFITS OF FINING & STABILITY AGENTS IN JUICE AND WINE

IMRPOVE CLARIFICATION	High solids can be problematic: they can cause off-odor production during fermentation, and they can make filtration difficult. A variety of fining agents including bentonite, chitosan, gelatin, and isinglass can be used for clarification.
TREAT AND PREVENT OXIDATION ISSUES	Oxidative damage in juice and wine is responsible for browning, loss of varietal aroma, and bruised apple/sherry off-aromas. The conditions leading to oxidative damage are not always understood, but treating problems early is always encouraged. Fining agents such as PVPP, casein, chitosan, and carbon can help treat and prevent oxidation issues.
SENSORY IMPROVEMENT	Fining agents can reduce astringency and bitterness (gelatin), counteract moldy and other unwanted aromas (carbon, PVPP, casein, certain chitosan formulations), and unmask some positive aromatics (gelatin).
COLLOIDAL STABILITY & 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 agents more efficient. Furthermore, using enzymes and fining/stability agents makes filtration more efficient.

QUICK GUIDE TO CHOOSING FINING & STABILITY AGENTS

Product	Pg	Category	Primary Use	Secondary Uses	Formulation	Stage of Winemaking
CRISTALLINE PLUS	125	Clarification	Clarification in wines with low solids, adds "brilliance"		Isinglass	Wine
INOCOLLE	124		Clarification	Unmask positive aromatics	Gelatin	Juice, Wine
NACALIT PORE-TEC	119			Compaction of lees Protein removal	Bentonite	Juice, Wine
QI'UP XC	122				Chitosan	Juice, Flotation, Wine
CASÉINATE DE POTASSIUM	120	Treat and Prevent Oxidative Damage	Treat and prevent oxidative damage	Counteract moldy aroma Diminish bitterness	Casein	Juice, Wine
BENTOLACT S	120			Reduce sulfur off odors Counteract moldy aromas	Bentonite-Casein blend	Juice, Wine
FRESHPROTECT	120			Diminish bitterness and herbaceousness	Bentonite-PVPP blend	In press, Juice, Wine
POLYCACEL	121			Freshen aromas Diminish bitterness	PVPP-Casein blend	Juice, Wine
POLYCEL	121		Removes color and browning induced by oxidation	Diminish bitterness and herbaceousness	PVPP	Fermentation, Wine
NO[OX]	122		Treat and prevent oxidative damage	Counteract moldy aromas Diminish bitterness	Chitosan	In press, Juice, During fermentation, Wine
BLANCOBENT UF	118	Protein Stability (Heat Stability)	Efficient protein removal compatible with crossflow applications		Bentonite	Wine, Immediately Pre-bottling
FERMOBENT PORE-TEC	119		Early protein removal during fermentation	Compaction of primary lees	Bentonite	During fermentation
GRANUBENT PORE-TEC	119		Protein removal	Clarification	Bentonite	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.*

Immediately prior to bottling	Mannoprotein	Enhance perception of sweetness and softness	Confers potassium tartrate stability	Colloidal Stability	125	CLARISTAR
Immediately prior to bottling	Mannoprotein	Improves roundness	Confers colloidal stability		126	FINAL TOUCH GUSTO
Immediately prior to bottling	Mannoprotein	Improves bubble quality and bubble persistence in sparkling wines			126	FINAL TOUCH POP NEW
Immediately prior to bottling	Mannoprotein	Protects aroma compounds, prevents premature aging			126	FINAL TOUCH TONIC
Immediately prior to bottling	Gum arabic	Enhance perception of sweetness and softness			127	FLASHGUM R LIQUIDE
Wine	Mannoprotein	Softens harsh tannin, increases fruit intensity			127	PURE-LEES DELICACY
Wine	Mannoprotein	Removes harsh tannin, increases roundness			127	PURE-LEES ELEGANCY
Wine	Mannoprotein	Scavenges oxygen			128	PURE-LEES LONGEVITY
Immediately prior to bottling	Mannoprotein-gum arabic	Enhance perception of sweetness and improves roundness			128	ULTIMA SOFT
Wine	Gelatin	Clarification	Removal of astringency and bitterness in red wines	Misc. Goals	123	COLLE PERLE
Juice, Flotation, Wine	Silica gel	Compaction of lees	Aids settling and prevents overfining (haze due to residual fining agent)		124	GELOCOLLE
In press, Juice, During fermentation, Wine	Activated Carbon		Decolorization		118	GRANUCOL FA
In press, Juice, During fermentation, Wine	Activated Carbon		Deodorization		118	GRANUCOL GE

Activated Carbon

GRANUCOL FA

Carbon with decolorizing properties

Stage of Winemaking: Juice, During fermentation, Wine

Contact Time: 24 hours

Impact: Removes color

Frequently used in whites, rosés, fruit wines, cider

1 kg – #15331
10kg – #15334

ERBSLÖH 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
- For maximum effect, use during fermentation for highly colored juices
- Activated carbon in pellet form (non-dusting) for ease of 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 cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice	100-1000 ppm	10-100 g/hL	0.83-8.3 lb/1000 gal
Wine	100-300 ppm	10-30 g/hL	0.83-2.5 lb/1000 gal

GRANUCOL GE

Carbon with deodorizing properties

Stage of Winemaking: Juice, During fermentation, Wine

Contact Time: 24 hours

Impact: Removes off-odors and flavors

Frequently used in whites, rosés, fruit wines, cider

1 kg – #15332
10kg – #15333

ERBSLÖH GRANUCOL GE™ is used to absorb off-aromas and off-flavors.

- Especially useful in removing moldy aromas from grapes contaminated with rot
- Also good at removing bitter notes
- Activated carbon in pellet form (non-dusting) for ease of 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 cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice	100-1000ppm	10-100 g/hL	0.83-8.3 lb/1000 gal
Wine	100-600 ppm	10-60g/hL	0.83-5.0 lb/1000 gal

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 whites, rosés

BLANCOBENT UF has fine particles and is free of cross-flow-damaging grit and sand.

Competitor Bentonite.

25 kg – #15320

ERBSLÖH 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 crossflow systems
- Powdered formulation is free of crossflow damaging sand and grit
- Can be prepared in room temperature water
- Always consult your crossflow manufacturer prior to use (approved for use with Pall Oenoflow system)
- Not recommended for use on wines that will not be crossflow filtered - use GRANUBENT PORE-TEC or NACALIT PORE-TEC depending on goals

Usage: Add BLANCOBENT UF to wine up to 12 hours prior to crossflow filtration. To prepare BLANCOBENT UF: add slowly to approximately 10 times its weight of room temperature water under constant stirring. Allow a rest period of 30-60 minutes, then stir again thoroughly. Let the mixture swell for 6–12 hours. Dispose of supernatant and add remaining bentonite slurry to the wine while thoroughly mixing.
Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended			
Wine	200-2000 ppm	20-200 g/hL	1.7-16.7 lb/1000 gal

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

5 kg – #15321
20kg – #15323

ERBSLÖH FERMOBENT PORE-TEC™ is used during fermentation to remove heat unstable proteins.

- 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
- Can be prepared in room temperature water
- Highly purified and almost dust-free sodium-calcium based bentonite produced using PORE-TECnology

Usage: Add FERMOBENT PORE-TEC slowly to approximately 5 times its weight of room temperature water and allow to swell. Allow a rest period of 4–6 hours. Dispose of supernatant and add remaining bentonite slurry to the juice or wine while thoroughly mixing. After fermentation, rack off bentonite and gross lees.
Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended			
Fermenting Juice	500-3000ppm	50-300 g/hL	4.2-25 lb/1000 gal

GRANUBENT PORE-TEC

Bentonite for protein stability

Stage of Winemaking: Juice or wine

Contact Time: 1-7 days

Impact: Removes proteins

Frequently used in whites, rosés

GRANUBENT PORE-TEC is cleaner and more uniform than other bentonites.

Competitor Bentonite.

20 kg – #15325

ERBSLÖH 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
- Can be prepared in room temperature water
- Highly purified and almost dust-free sodium-based bentonite produced using PORE-TECnology

Usage: Add GRANUBENT PORE-TEC slowly to approximately 10 times its weight of room temperature water under constant stirring. Let the mixture swell for 4–8 hours. Dispose of supernatant and add remaining bentonite slurry to the juice or wine while thoroughly mixing.
Storage: Dated expiration. Store in a dry, odor-free and well-ventilated environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice	350-750 ppm	35-75 g/hL	2.9-6.3 lb/1000 gal
Wine	200-1500 ppm	20-150 g/hL	1.7-12.6 lb/1000 gal

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 whites, rosés, fruit wines, cider, mead

5 kg – #15322
20kg – #15324

NACALIT PORE-TEC™ is specifically formulated for instances where superior flocculation, adsorption, and clarification are required.

- Helps to compact lees
- Can be prepared in room temperature water
- Highly purified and almost dust-free sodium-calcium based bentonite produced using PORE-TECnology

Usage: Add NACALIT PORE-TEC slowly to approximately 5-10 times its weight of room temperature water under constant stirring. Allow to swell for a minimum of 4–12 hours. Dispose of supernatant and add remaining bentonite slurry to the juice or wine while thoroughly mixing.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice or wine	500-1500 ppm	50-150 g/hL	4.2-12.6 lb/1000 gal

Casein and/or PVPP

BENTOLACT S

Bentonite-casein blend: Treats and prevents oxidative damage, removes off-odors

Stage of Winemaking: Juice, wine (pre-protein stabilization)

Contact Time: 1-2 weeks

Impact: Treatment and prevention of oxidation, cleans up off odors and flavors

Frequently used in whites, rosés, fruit wines, cider

5 kg – #15788

IOC 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 refresh wines with oxidized and moldy fruit aromas
- 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. May take 7-14 days to settle. Use BENTOLACT S the same day it is hydrated.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice	200-1000 ppm	20-100 g/hL	1.7-8.4 lb/1000 gal
Wine	1000-2000 ppm	100-200 g/hL	8.4-16.8 lb/1000 gal

CASÉINATE DE POTASSIUM

Casein: Treats and prevents oxidative damage

Stage of Winemaking: Juice, wine (pre-protein stabilization)

Contact Time: 1-2 weeks

Impact: Treatment and prevention of oxidation

Frequently used in whites, rosés, fruit wines, cider

5 kg – #15808

CASÉINATE DE POTASSIUM is used for the treatment of oxidized phenolics and bitter compounds.

- Helps freshen wine and reveal muted aromas
- Can also be used to help prevent oxidation of specific phenolic compounds
- 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 water 15–25°C (59–77°F). Mix well and ensure there are no clumps. Once hydrated, CASÉINATE DE POTASSIUM should be used within 2 hours. For juice, add before settling or at the start of alcoholic fermentation. For wine, mix vigorously after adding as CASÉINATE DE POTASSIUM can float. May take 7-14 days to settle.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice	500-1000 ppm	50-100 g/hL	4.2-8.4 lb/1000 gal
Wine	200-1000 ppm	20-100 g/hL	1.7-8.4 lb/1000 gal

FRESHPROTECT

Bentonite-PVPP blend: Treats oxidative damage, bitterness, and herbaceousness

Stage of Winemaking: Juice, wine (pre-protein stabilization)

Contact Time: 1-2 weeks

Impact: Softens wine and removes oxidized characters

Frequently used in whites, rosés, fruit wines, cider

5 kg – #15791

IOC 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 water 15–25°C (59–77°F). Mix well and allow to sit for 1 hour. Add the mixture into the tank slowly; making sure the solution is thoroughly mixed. May take 7-14 days to settle.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice or ***wine***	200-1000 ppm	20-100 g/hL	1.7-8.3 lb/1000 gal

POLYCACEL

PVPP-Casein blend: Prevents browning and pinking, and refreshes aged wines

Stage of Winemaking: Juice, wine (pre-protein stabilization)

Contact Time: 10-21 days

Impact: Treatment and prevention of oxidation, freshens aromas

Frequently used in whites, rosés, fruit wines, cider

1 kg – #15785
5 kg – #15786

IOC 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
- Can be used to refresh aged wines
- 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 water 15–25°C (59–77°F). Mix well and allow to sit for 1 hour. Use POLYCACEL within 2 hours after it has been hydrated. 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. May take 10-21 days to settle.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice	300-700 ppm	30-70 g/hL	2.5-5.8 lb/1000 gal
Wine	150-300 ppm	15-30 g/hL	1.25-2.5 lb/1000 gal

POLYCEL

PVPP: Prevents and treats browning, pinking, and bitterness

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

1 kg – #15784

IOC 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 water 15–25°C (59–77°F). 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 cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice	400-800 ppm	40-80 g/hL	3.3-6.7 lb/1000 gal
Wine (Prevention)	150-300 ppm	15-30 g/hL	1.25-2.5 lb/1000 gal
Wine (Treatment)	300-500 ppm	30-50 g/hL	2.5-4.2 lb/1000 gal

Chitosan

NO[OX]

Chitosan-bentonite blend: Treats and prevents oxidative damage; 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 wines, cider

5 kg – #16421

IOC NO[OX]™ can be used to remove undesirable aromas and oxidized compounds.

- Non-animal, non-allergenic specialized preparation of chitosan blended with bentonite
- 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
- Viable alternative to casein for juice and wine fining

Note: For this use, some of the materials in NO[OX] are 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 in a cool, dry, odor-free environment. Once opened, use immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice	300-800 ppm	30-80 g/hL	2.5-6.7lb/1000 gal
Wine	200-600 ppm	20-60 g/hL	1.7-5.0 lb/1000 gal

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 wines, cider, mead

1 kg – #16430

IOC QI'UP XC™ is used for clarification, even in difficult conditions.

- Non-animal, non-allergenic specialized preparation of chitosan activated with tartaric acid
- Viable alternative to gelatin for juice and wine clarification
- The tartaric acid portion results in a high surface charge that allows for the rapid aggregation of solid particles
- This innovative floccing agent can also be used for juice flotation
- When used during flotation the juice must not have started fermentation, it must be pectin-free (try 3-4 mL/hL SCOTTZYME PEC5L™), and temperature should be >13°C (55°F)
- To aid in lees/cap compaction during settling and flotation, QI'UP XC should be used in conjunction with bentonite. We recommend 10-30 g/hL of NACALIT PORE-TEC™

Note: For this use, some of the materials in QI'UP XC are 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 in a cool, dry, odor-free environment. Once opened, use immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice or ***wine***	30-100 ppm	3-10 g/hL	0.25-0.83 lb/1000 gal

ARTICLE

REPLACING ALLERGENIC AND ANIMAL-BASED FINING AGENTS

Many common fining agents are derived from animal sources including gelatin (from livestock), casein (from milk), and more. These fining agents are effective because they contain proteins that have the ability to bind with solids and other undesirable compounds in wine.

While these products have been safely used in many food and beverage applications for centuries, evolving consumer preferences have caused winemakers to look for alternatives. Milk, and therefore casein, is considered a major food allergen and animal-derived gelatins are of concern to those subscribing to vegan and vegetarian diets. Fortunately, there are non-animal-based alternatives to gelatin and casein.

WHAT ARE GELATIN & CASEIN USED FOR?

Gelatin is commonly derived from the hydrolysis of pig or other animal collagens. It is used for clarification, reducing astringency/bitterness, and removing some off-aromas.

Casein is derived from milk. It is used to treat and prevent oxidative damage (including browning/pinking), counteract moldy aromas, and diminish bitterness.

CHITOSAN AS AN ALTERNATIVE

Chitosan can replace both gelatin and casein depending on the chitosan formulation. Chitosan is derived through the deacetylation of chitin which is naturally produced by many living organisms (fungus, shellfish, etc.). Chitin from the fungus *Aspergillus niger* is a non-allergenic source. Depending on the source and preparation, chitosan can vary in degree of deacetylation, thus impacting the molecules' ionic charge, molecular weight, and solubility. By changing one or more of these properties, the functionality of the chitosan molecule changes, thereby changing the winemaking application.

GELATIN → QI'UP XC

QI'UP XC™ is a fungal derived chitosan-based clarification agent that can be used *instead of gelatin*. This formulation for clarification has strong positive charges to promote flocculation and destabilization of colloids which increases clarification rates. QI'UP XC is blended with tartaric acid to allow it to carry an even higher charge, further increasing clarification efficiency.

CASEIN → NO[OX]

NO[OX]™ is a fungal derived chitosan-based antioxidant and can be used *instead of casein* to treat and prevent oxidative damage, preserving color and aroma.

This formulation for antioxidative activity blocks the formation of free radicals via direct scavenging or via indirect means through metal ion (iron and copper) chelation. This means that the oxidation cascade is blocked, and browning is minimized. Chitosan is also thought to inhibit browning due to absorption of oxidized phenolic compounds or by coagulation of suspended solids to which polyphenol oxidases are bound.

Gelatins

COLLE PERLE

IOC

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 whites, rosés, fruit wines, cider, mead

1 L – #15798
5 L – #15799
20 L – #15800

IOC 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 COLLE PERLE to wine and mix thoroughly. Racking should be done after settling (typically 1 week). 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 129 for directions).
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Once opened, use immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice or ***wine***	800-1500 ppm	80-150 mL/hL	3.0-5.7 L/1000 gal

Fruit-Forward Reds

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 whites, rosés, fruit wines, cider

1 L – #15795
5 L – #15796

IOC INOCOLLE™ is a multi-purpose gelatin that is equally useful in juice and wine for clarification and improving aromas.

- Can be used for clarification in white and rosé wines, resulting in improved brilliance and suppleness
- In red wines, it can improve the aromas and flavors of the finished wine
- Can remove colloidal and unstable material
- It is particularly useful for juice fining and flotation
- Flocculates and settles well, especially when used in conjunction with the silica gel GELOCOLLE
- Partially hydrolyzed gelatin solution

Usage - Juice: Dilute INOCOLLE 1:1 in water. Add to juice gradually and mix thoroughly. Rack once settled.
Usage - Wine: Dilute INOCOLLE 1:1 in water. Add INOCOLLE to wine gradually and mix thoroughly. Racking should be done after settling (typically 1 week). It is not recommended to leave gelatins in wine for more than 30 days. INOCOLLE can be used in conjunction with GELOCOLLE to improve settling or prevent overfining (see pg 129 for directions).
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Once opened, use immediately.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice or ***wine***	300-1000 ppm	30-100mL/hL	1.1-3.8 L/1000 gal

Silica Gel

GELOCOLLE

Silica gel for improved settling, lees compaction, and prevents overfining

Stage of Winemaking: Juice or wine

Contact Time: 1-2 weeks

Impact: Aids settling, compaction of lees

Frequently used in whites, rosés, fruit wines, cider

5 L – #15783

IOC 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
- Must be removed from wine via filtration per TTB regulations due to the silica portion

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 cool, dry, odor-free environment. Once opened, keep tightly sealed and dry. Do not refrigerate or freeze! Gelocolle solidifies at temperatures of less than 32°F (0°C). This process is irreversible.

Recommended Dosage - Bench trials recommended for ***wine***			
Juice or ***wine***	200-1000 ppm	20-100 mL/hL	0.75-3.8 L/1000 gal

Isinglass

CRISTALLINE PLUS

Isinglass to assist with clarification and brightening

Stage of Winemaking: Wine (pre-bentonite addition)

Contact Time: 2-4 weeks

Impact: Clarification

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

100 g – #15770
1 kg – #15771

IOC 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
- Works best when the initial solid levels are relatively low
- CRISTALLINE PLUS is not sensitive to cold temperatures but may be slow to complete settling; co-fine with GELOCOLLE for faster settling
- Blend of isinglass and citric acid stabilized with potassium metabisulfite

Usage: Dissolve CRISTALLINE PLUS in 150–200 times its weight of 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 cool, dry, odor-free environment. Once opened, keep tightly sealed and dry.

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

Mannoproteins & Gum Arabics

Mannoproteins are components of yeast cell walls and are released during alcoholic fermentation and aging. Mannoproteins are known to confer potassium tartrate and protein stability, reduce astringency, improve color, and improve wine texture, softness, and roundness.

The mannoproteins of different *Saccharomyces* strains vary in composition and molecular weight, which affects their properties in wine. Even though the mannoprotein products in our portfolio have the same basic composition and all confer colloidal stability, they all have unique secondary impacts based on the strains they were prepared from.

CLARISTAR

Mannoprotein for potassium tartrate stabilization

Stage of Winemaking: Pre-bottling

Requires Racking: No

Impact: Inhibits potassium tartrate precipitation

Format: Liquid

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

2.5 L – #17000
20 L – #17001

CLARISTAR® assists with potassium tartrate stability (inhibits potassium drop-out) and colloidal stability in compatible wines.

- 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)
- CLARISTAR is not appropriate for calcium tartrate stabilization
- 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 without additional racking because CLARISTAR is 100% soluble in wine
- Mannoproteins have some stabilizing effects on wine, though the addition of this product is not a replacement for good winemaking practice or thorough analysis
- Not for use in sparkling or sparkling base wine

Usage: CLARISTAR should be the last commercial product added to the wine before bottling after final blending, protein stabilization, fining, and pre-filtration (DE, lenticular, or sheet filtration) have been completed. CLARISTAR should be added to whites 24-48 hours prior to bottling and reds 4-5 days prior to bottling to allow for proper integration. CLARISTAR is able to pass through final membrane filters (0.45 um) found on most bottling lines, though filtration is not required after adding CLARISTAR. Note: CLARISTAR can pass through a 0.2 um nominal crossflow filter.
Storage: Dated expiration. Store in a cool, dry environment under 10°C (50°F). Once opened, use within 15 days. Can be frozen once.

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

Fruit-Forward Reds

FINAL TOUCH GUSTO

Improves roundness and smoothness and can contribute to colloidal stability

Stage of winemaking: Pre-bottling

Requires racking: No

Impact: Confers colloidal stability and improves wine quality

Format: Liquid

Frequently used in reds

1 L – #17032

FINAL TOUCH GUSTO™ improves roundness and smoothness and can contribute to colloidal stability.

- Astringency is reduced and the wine is smoother and rounder
- Aroma intensity, freshness, and fruitiness are increased
- Completely soluble and can be added prior to final filtration
- Special preparation of liquid mannoproteins

Usage: FINAL TOUCH GUSTO is completely soluble and should be added to wine (just prior to bottling) that has already been protein-stabilized and pre-filtered (DE, lenticular, or sheet filtration).
If the wine will be filtered at bottling, add FINAL TOUCH GUSTO 24–72 hours prior to bottling to allow for proper integration.
FINAL TOUCH GUSTO is able to pass through final membrane filters (0.45 um) found on most bottling lines, though filtration is not required after adding FINAL TOUCH GUSTO.
Note: FINAL TOUCH GUSTO can pass through a 0.2 um nominal crossflow filter.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Once opened keep tightly sealed and use within two weeks.

Recommended dosage - Bench trials recommended			
Wine	100-400 ppm	10-40 mL/hL	0.38-1.5 L/1000gal

NEW

FINAL TOUCH POP

Stabilizes bubbles, colloids, and aromas in sparkling wines

Stage of winemaking: Pre-bottling

Requires racking: No

Impact: Confers colloidal stability and improves wine quality

Format: Liquid

Frequently used in sparkling wines, cider

1 L – #17033

FINAL TOUCH POP™ is a special preparation of liquid mannoproteins that can contribute to colloidal stability. Although initially developed for sparkling wine, it can also be used in still wines.

- Helps improve bubble quality and bubble persistence
- Preserves freshness, elegance, and balance
- Wines are more aromatically intense, with heightened mineral notes
- Fully soluble and can be added 24-72 hours prior to bottling. It can be added directly to the wine (still or sparkling) or to the dosage of liqueur after disgorging (traditional method)

Usage: FINAL TOUCH POP is completely soluble and should be added to sparkling wines after the second fermentation just prior to bottling (Charmat method), or to the dosage of liqueur after disgorging (Traditional method).
FINAL touch POP can pass through final membrane filters (0.45 um) found on most bottling lines, though filtration is not required after adding FINAL touch POP.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Once opened keep tightly sealed and use within two weeks.

Recommended dosage - Bench trials recommended			
Wine	200-400 ppm	20-40 mL/hL	0.75-1.5 L/1000gal

FINAL TOUCH TONIC

Protects aroma compounds, stabilizes colloids, can extend shelf-life in whites and rosés

Stage of winemaking: Pre-bottling

Requires racking: No

Impact: Confers colloidal stability and improves wine quality

Format: Liquid

Frequently used in whites, rosés

1 L – #17030

FINAL TOUCH TONIC™ can prevent premature aging and preserves quality of white and rosé wines.

- Preserves freshness and prevents oxidative aromas
- Wines are more aromatically intense
- Completely soluble and can be added prior to final filtration
- Special preparation of liquid mannoproteins

Usage: FINAL TOUCH TONIC is completely soluble and should be added directly to white and rosé wine (just prior to bottling) that has already been protein-stabilized and prefiltered (DE, lenticular, or sheet filtration).
If the wine will be filtered at bottling, add FINAL TOUCH TONIC 24-72 hours prior to bottling to allow for proper integration.
FINAL TOUCH TONIC can pass through final membrane filters (0.45 um) found on most bottling lines, though filtration is not required after adding FINAL TOUCH TONIC.
Note: FINAL TOUCH TONIC can pass through a 0.2 um nominal crossflow filter.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Once opened keep tightly sealed and use within two weeks.

Recommended dosage - Bench trials recommended			
Wine	200-400 ppm	20-40 mL/hL	0.75-1.5 L/1000gal

FLASHGUM R LIQUIDE

Liquid gum arabic for colloidal protection

Stage of Winemaking: Pre-bottling

Requires Racking: No

Impact: Colloidal protection, sweetness

Format: Liquid

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

1 L – #15772
5 L – #15773

IOC FLASHGUM R LIQUIDE™ helps reduce the risk of colloidal deposits in bottled wine and cider.

- Protects color in reds, rosés, and fruit wines
- Gives perception of sweet and soft characters on the palate
- Reduces astringency and increases the perception of volume and fullness in the mouth
- Especially usefully in unfiltered wines, where it can minimize colloidal sediment
- Can be added 24-72 hours before bottling and does not impact filtration throughput (if filtering)
- Gum arabic derived from *Acacia seyal*

Usage: Add FLASHGUM R LIQUIDE directly to the wine and mix. If the wine will be filtered, add FLASHGUM R LIQUIDE 24-72 hours before the final membrane filtration and conduct filterability trials. For full usage details see scottlab.com
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended			
Wine	400-1200 ppm	40-120 mL/hL	1.5-4.5 L/1000 gal

PURE-LEES DELICACY

Gently softens harsh tannins, increases fruit intensity, confers colloidal stability

Stage of winemaking: End of alcoholic fermentation or pre-bottling (check on filterability impact)

Contact Time: Min. 2 days, no max. time

Requires Racking: Yes

Impact: Smooths wine and assists with colloidal stability

Format: Powder

Frequently used in reds

1 kg – #15276

PURE-LEES DELICACY™ is a mannoprotein preparation that positively impacts mouthfeel, aromas, and colloidal stability.

- Coats tannins leading to smoother wines
- Wines appear to have greater fruit expression
- Although primarily recommended for red wines, can be used in phenolic white and rosé wines
- Preparation from a specific strain of enological yeast

Usage: Mix PURE-LEES DELICACY in 10 times its weight of water or wine. Stir gently then add to wine and mix thoroughly. Rack once lees are well settled.
Storage: Dated expiration. Store in a cool and dry environment at 25°C (75°F). Once opened keep tightly sealed and dry.

Recommended dosage - Bench trials recommended			
Wine	200-400 ppm	20-40 g/hL	1.7-3.3 lb/1000gal

PURE-LEES ELEGANCY

Removes harsh tannin to increase roundness, confers colloidal stability

Stage of winemaking: End of alcoholic fermentation or pre-bottling (check on filterability impact)

Contact Time: Min. 2 days, no max. time

Requires Racking: Yes

Impact: Removes harsh tannins and assists with colloidal stability

Format: Powder

Frequently used in reds

1 kg – #15278

PURE-LEES ELEGANCY™ is a mannoprotein preparation that balances mouthfeel and assists with colloidal stability.

- Fines out harsh tannins leading to less aggressive and bitter wines
- Wine balance and mouthfeel is improved
- Increase in fruity notes
- Preparation from a specific strain of enological yeast

Usage: Mix PURE-LEES ELEGANCY in 10 times its weight of water or wine. Stir gently then add to wine and mix thoroughly. Rack once lees are well settled.
Storage: Dated expiration. Store in a cool and dry environment at 25°C(75°F). Once opened keep tightly sealed and dry.

Recommended dosage - Bench trials recommended			
Wine	200-400 ppm	20-40 g/hL	1.7-3.3 lb/1000gal

PURE-LEES LONGEVITY

Scavenges oxygen, confers colloidal stability

Stage of winemaking: End of alcoholic fermentation or pre-bottling (check on filterability impact)

Contact Time: Minimum 1 week

Requires Racking: Yes

Impact: Scavenges oxygen

Format: Powder

Frequently used in whites, rosés, reds, cider

1 kg – #15249

PURE-LEES LONGEVITY™ helps to increase shelf-life and protect color and aroma while also helping to stabilize colloids.

- Due to high oxygen uptake capacity, it minimizes loss of fruit character and browning, which increases shelf-life
- Wines are reported to be fresher, fruitier, and rounder
- Rapidly and irreversibly, scavenges up to 1 mg/L O_2
- Inspired by the practice of traditional lees aging, PURE LEES LONGEVITY will continue to scavenge oxygen until its capacity is exhausted
- Can replace SO_2 as an antioxidant in no- and low-SO_2 winemaking, though it is not a direct substitute for SO_2 as it has no antimicrobial activity
- PURE-LEES LONGEVITY was developed in collaboration with the National Research Institute for Agriculture, Food and the Environment (INRAe), France

Usage: Suspend PURE-LEES LONGEVITY in 10 times its weight of water 59–77°F (15–25°C), gently mix then add to wine. Mix thoroughly. Minimum of 24 hours of contact time is needed for optimal impact. Rack once lees are well-settled.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended			
Wine	200-400 ppm	20-40 g/hL	1.7-3.4 lb/1000 gal

ULTIMA SOFT

Mannoprotein-gum arabic blend for colloidal protection at bottling

Stage of Winemaking: Pre-bottling

Requires Racking: No

Impact: Balancing and softening

Format: Powder

Frequently used in whites, rosés, fruit wines, cider

1 kg – #17012

IOC 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 mid-palate
- Fully soluble and 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

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 cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage - Bench trials recommended			
Wine	150-300 ppm	15-30 g/hL	1.25-2.5 lb/1000 gal

PROTOCOL

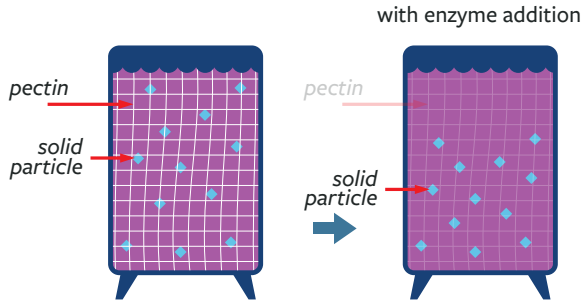
BEST PRACTICES FOR SETTLING WITH FINING AGENTS

Static settling is the most common method of using and removing fining agents. Agents are added to a tank, the tank is mixed, and the agent settles over time, binding and removing solids and other undesired compounds. Scott Laboratories recommends the following order of operations: **1st Add Enzymes; 2nd Add Fining Agent(s); 3rd Allow Time to Settle.**

ADD ENZYMES

Enzymes break down pectin in juice and wine. Pectin traps solids and other undesirable compounds in suspension and prevents settling. Pectin will also prevent fining agents from settling.

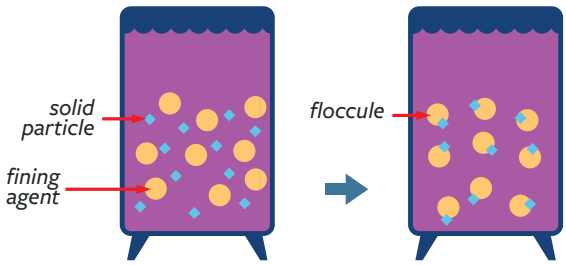
It is difficult to know if a wine has a problematic level of pectin without testing, and bench top trials can be unreliable. Typically, pectin problems are discovered when a fining agent won't settle out. At this point, it may be too late to use enzymes as some fining agents like bentonite can deactivate enzymes. **Proactive use of enzymes is an inexpensive fix to avoid this issue. Enzyme use during clarification will also make future filtration easier.**



ADD FINING AGENT(S)

Fining agents bind with solids and other undesirable compounds, forming larger molecules called **floccules**, which fall out of solution more quickly than unbound solids. To determine the most appropriate fining agent and dosage, bench trials should be conducted.

When adding a fining or stability agent it is important to properly rehydrate the product, as well as adequately disperse it into the wine. Closed circulation after addition is recommended at any winemaking stage.



ALLOW TIME TO SETTLE

The floccules created by the fining agent will settle to the bottom of the tank over time. Temperature is the main driver of settling rate, and cold temperatures (close to freezing) can inhibit settling and will also inhibit most enzyme activity.

MICROBIAL CONTROL

Scott Laboratories loves microbial diversity... but not when it interferes with the taste and quality of wine. Microbial spoilage can occur at all stages of winemaking and we're here to help you protect your wine from grape to bottle. If your wine is stinky, smells like vinegar, or is fermenting without your permission, we're here to help. With our decades of experience, we can provide both product and process solutions that best fit your needs and challenges.

An important part of making wine is controlling microbes during pre-fermentation, fermentation, aging, and packaging.

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

MICROBIAL CONTROL AGENTS WORK IN ONE OF THREE WAYS:

REMOVAL	Microorganisms are physically removed from the wine. Removal strategies include filtration, centrifugation, and some types of fining followed by racking.
INHIBITION	Microbe replication is slowed or stopped, but organisms are not necessarily killed. Microbes may start to grow and multiply once the inhibitory pressure is removed. Inhibition strategies include acidification to lower pH and use of sulfur dioxide and lysozyme at non-lethal concentration.
DESTRUCTION	Microorganisms are killed and will not survive to replicate. Destruction strategies include NO BRETT INSIDE® or BACTILESS™ additions, the 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 47-50), lysozyme, or BACTILESS.
PROBLEMS ASSOCIATED WITH HIGH PH WINEMAKING	The higher the pH, the more diverse the microbial population. Additionally, the antimicrobial activity of SO_2 is less effective at higher pHs and other microbial control strategies may need to be used. Careful attention to wine microbiology and chemistry is advised.
ACETIC ACID BACTERIA (AAB)	AAB are generally problematic in the pre- and post-fermentation phases. They can oxidize ethanol to acetic acid (VA), produce polysaccharides that can cause clarification and filtration issues, and cause changes in aromas and flavors. Control growth via BACTILESS™ and SO_2 and by limiting oxygen.
LACTIC ACID BACTERIA (LAB)	LAB are responsible for converting malic acid into lactic acid. *Oenococcus oeni* is favorably associated with malolactic fermentation (MLF) but can also produce volatile acidity (VA) under certain conditions. *Pediococcus* and *Lactobacillus* are usually considered spoilage organisms. Control growth with BACTILESS™, 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
Transportation, incoming fruit, and in press	White, Rosé	Prevent VA from indigenous yeast and/or bacteria	LEVEL 2 INITIA™ (see pg 49), SO_2*
	Red		GAIA™ (see pg 48), SO_2*
Juice or Must	White, Rosé	Prevent VA from indigenous yeast and/or bacteria	BACTILESS™, LEVEL 2 INITIA™ (see pg 49), LYSOZYME, SO_2*
	Red		BACTILESS™, GAIA™ (see pg 48), LYSOZYME, SO_2*
Fermentation	Red, White, Rosé	Prevent VA from indigenous yeast and/or bacteria	INOCULATE WITH YEAST (see pgs 22-41)
		Protect from lactic acid bacteria during sluggish/stuck fermentation	LYSOZYME, SO_2*
		Delay MLF	LYSOZYME, SO_2*
		Inhibit MLF	BACTILESS™, LYSOZYME, SO_2*
		Control *Brettanomyces*	Inoculate ML bacteria with yeast (co-inoculation) or add ML bacteria as soon as alcholic fermentation is complete (see ML section pgs 73-78)
Aging	Red, White, Rosé	Control lactic acid bacteria	BACTILESS™, LYSOZYME, SO_2*
		Control acetic acid bacteria	BACTILESS™, SO_2*
		Control *Brettanomyces*	NO BRETT INSIDE®, SO_2*
Pre-Bottling	Red, White, Rosé	Control spoilage organisms	SO_2*
Bottling		Prevent refermentation & spoilage in the bottle	VELCORIN® (see pg 135)

*Scott Laboratories offers multiple forms of SO_2 including INODOSE TABLETS, and Potassium Metabisulfite (see product descriptions on the following pages, or visit scottlab.com for more information).

DELVOZYME (LYSOZYME) OENOBRANDS

Lactic acid bacteria inhibitor

USES INCLUDE

- **Juice or Must Phase:** Inhibit spoilage characters due to uncontrolled LAB growth
- **Protection During Stuck/Sluggish Fermentations:** Reduce the risk of VA production by LAB
- **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
- Inhibit MLF when Blending Partial and Complete ML Wines

5 kg – #16404

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

- Can be used at any stage of the winemaking process
- Lysozyme degrades the cell walls of lactic acid bacteria (gram-positive bacteria). It is not active against acetic acid bacteria (gram-negative bacteria) or yeast
- Effectiveness depends on the number of cells present
- Recommended contact time is seven days after which racking is recommended
- Should be removed from white and rosé wines with 5-10 g/hL bentonite, but in red wines it will interact with tannin and settle on its own

Warning: In the case of low color potential grapes such as Pinot noir, caution is needed when adding lysozyme prior to completion of alcoholic fermentation. If spoilage yeasts such as *Brettanomyces* are suspected, SO_2 addition should not be delayed.

Usage: Rehydrate lysozyme in 5–10 times its weight of warm water. Stir gently for one minute and avoid foaming. Allow to soak for 45 minutes. Repeat until the solution is a clear, colorless liquid. To ensure accurate results, wait one week before culturing for microbes. If lysozyme-treated samples are assessed too quickly after treatment, results may show a false-positive for bacterial growth. It is important to note that lysozyme requires a minimum seven day contact time to allow the enzyme to work.

Storage: Dated expiration. Store in a cool 41-59°F (5-15°C), dry, odor-free environment. Once rehydrated, DELVOZYME should be used immediately.

Recommended Dosage - See scottlab.com for more detailed dose rates			
Juice or ***Wine***	100-500 ppm	10-50 g/hL	0.83-4.17 lb/ 1000 gal

BACTILESS LALLEMAND

Acetic acid and lactic acid bacteria control

USES INCLUDE

- **Juice or Must Phase:** To control spoilage bacteria without negatively impacting alcoholic or malolactic fermentation (MLF)
- **Post Alcoholic Fermentation Phase:** To control spoilage bacteria populations if MLF is not desired
- **Post Malolactic Fermentation Phase:** To reduce bacteria populations, including malolactic bacteria

500 g – #15232

BACTILESS™ is an allergen-free, innovative microbial control agent used to protect wine from acetic and lactic acid spoilage bacteria.

- When used in juice/must rack before initiating malolactic fermentation, when added to wine rack after 10 days contact time
- Offers an alternative to lysozyme treatment and/or significant amounts of SO_2 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*
- When BACTILESS is used early in the winemaking process LALVIN VP41® is the suggested malolactic bacteria strain

Note: For this use, some of the materials in BACTILESS are listed by the TTB as acceptable in good commercial winemaking practices in 27 CFR 24.250. For more information, please visit TTB.gov.

Usage: Suspend BACTILESS in 5–10 times its weight of cool water or wine (BACTILESS is insoluble, so it will not go into solution). Add to juice/wine and mix thoroughly. Leave BACTILESS in contact with the wine for 10 days, then conduct a clean racking.

To assess BACTILESS effectiveness wait 20–30 days post-racking before microbial analysis by traditional plating, microscopic observations or RT-PCR.

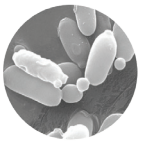
Storage: Dated expiration. Store in a dry environment below 25°C (77°F). Reseal opened packaging immediately.

Recommended Dosage			
Juice or ***Wine***	200-500 ppm	20-50 g/hL	1.67-4.17 lb/ 1000 gal

NO BRETT INSIDE

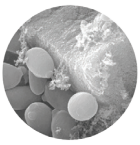
Brettanomyces spp. control agent

VISUALIZATION OF NO BRETT INSIDE® EFFECT ON BRETTANOMYCES



Before

Scanning Electron Micrograph x 20,000 magnification Brettanomyces cells prior to being treated with NO BRETT INSIDE.



After

Scanning Electron Micrograph x 20,000 magnification Brettanomyces cells treated with 4 g/hL of NO BRETT INSIDE. Image shows Brettanomyces cells attached to the surface of the chitosan.

Images courtesy of Biljana Petrova and Dr. Charles G. Edwards, Washington State University, Pullman, WA.

100 g – #16410

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 post alcoholic fermentation to reduce *Brettanomyces* populations when MLF is either already complete or is not desired
- Should never be used until MLF is complete without consulting Scott Laboratories
- Recommended contact time is 10 days
- Offers an interesting alternative to significant amounts of SO_2 but does not replace the use of SO_2 as it does not have antioxidant or antibacterial properties
- NO BRETT INSIDE cannot decrease any sensory contribution (barnyard, medicinal, smoky) already produced by spoilage *Brettanomyces*
- 100% natural, non-allergenic source of chitosan from a non-GMO strain of *Aspergillus niger*

Usage: Suspend NO BRETT INSIDE in 5 times its weight of cool water (NO BRETT INSIDE is insoluble, so it will not go into solution). NO BRETT INSIDE can be added during a pump-over or tank/barrel mixings to ensure a homogeneous addition. Leave the NO BRETT INSIDE in contact with the wine for 10 days and then conduct a clean racking. To assess NO BRETT INSIDE effectiveness, wait 20–30 days post-racking before microbial analysis by traditional plating, microscopic observations or RT-PCR.
Storage: Dated expiration. Store in a cool, dry, odor-free environment. Reseal opened packaging immediately.

Recommended Dosage			
Wine	40-80 ppm	4-8 g/hL	0.33-0.67 lb/1000 gal

INODOSE TABLETS

Effervescent sulfur dioxide tablets

2 g (48/box) – #15775
5 g (42/box) – #15776

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

- Blend of potassium metabisulfite and potassium bicarbonate (to assist with dispersion and has negligible effect on pH)
- Tablets 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

Usage: Remove tablet from blister pack and add directly to vessel. Larger vessels may require additional mixing to acheive full homogenization.
Storage: Store in a dry, well-ventilated environment at temperatures below 77°F (25°C). Once the pack has been opened it should be used immediately.

INODOSE TABLETS Conversion Chart (ppm Total SO_2)

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

Note: The tablet sizes (2g and 5g) describe the Total SO_2 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

1 kg – #POTMETA1K

Potassium metabisulfite can be used throughout the winemaking process from grape receipt to finished wine to adjust sulfur dioxide (SO_2).

TARTARIC ACID

5 kg – #TARTARIC5

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

VELCORIN LANXESS

An alternative to pasteurization to prevent refermentation in package

APPLICATIONS:

- To help prevent refermentation in finished wines (including no/low alcohol wines)
- To reduce or eliminate sorbic acid
- To decrease the amount of sulfur dioxide used in wine
- Expanded packaging options (cans)

6kg – #18006

Velcorin® is the trade name for dimethyldicarbonate (DMDC), a microbial control agent produced by LANXESS®. Since 1988, Velcorin has been used in the United States in wine, low-alcohol wine, and non-alcoholic wine as well as juice, juice sparklers, sports drinks, and ready-to-drink teas. Velcorin is very effective at low dosages against a broad range of yeast, bacteria and molds. Unlike other preservatives traditionally used in wine or other specialty beverages, Velcorin is non-persistent and does not affect wine taste, aroma or color. In addition, Velcorin can remain active for several hours (depending on hydrolysis rate) thereby helping to eliminate contamination from other sources such as bottles, closures and filling equipment.

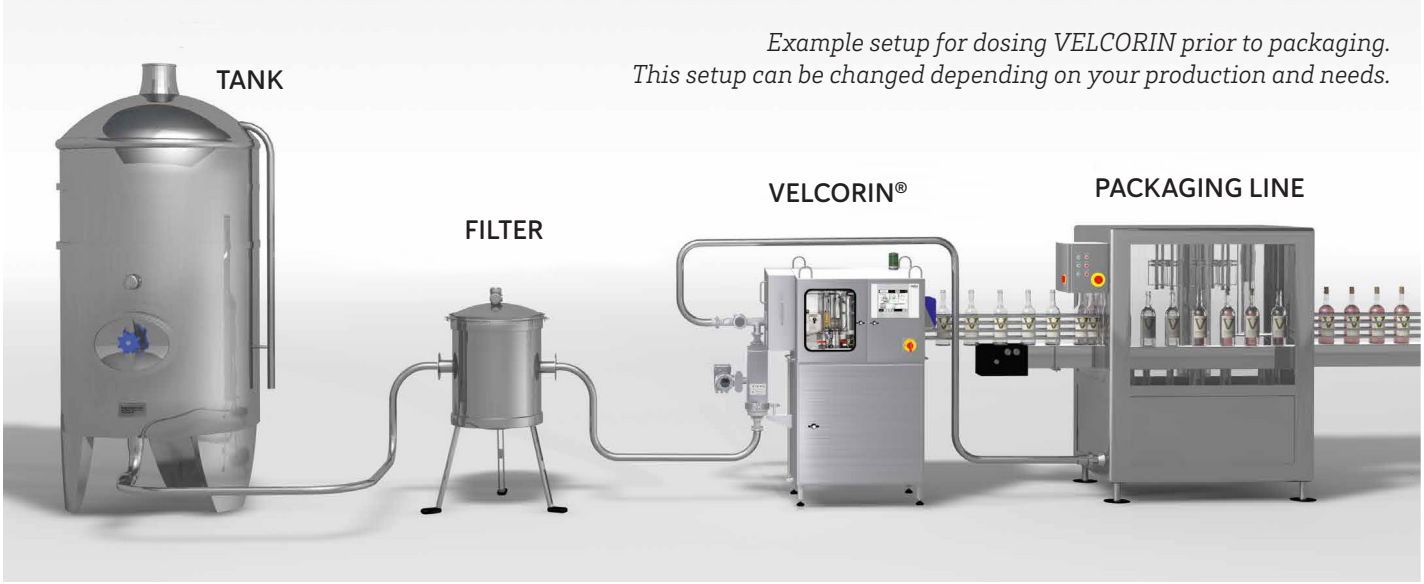
HOW VELCORIN IS USED

VELCORIN must be dosed into wine using an approved VELCORIN dosing machine. Due to the unique physical properties of VELCORIN, LANXESS requires the use of approved dosing machines to ensure safe handling. DMDC is hydrophobic and solidifies at 17°C (63°F) and the dosing machines are engineered to prevent solidification and aid in solubility. Dosers also include specific safety features and a special metering system. If you do not own a dosing machine, there are several mobile VELCORIN suppliers (see FAQ on our website).

VELCORIN EFFICACY TESTING AT ETS LABORATORIES

Scott Labs has partnered with ETS Laboratories to offer options for lab testing on products using VELCORIN. For more information see **etslabs.com.**

- **VELCORIN Challenge Test**: Lab procedure used to determine if the population of microbes present in a product can be inactivated with the appropriate dose of VELCORIN.
- **VELCORIN Microbiological Validation Test:** Bottle sterility testing can test beverage samples that have already been dosed with VELCORIN during packaging for effectiveness.
- **VELCORIN/Methanol Validation Test:** Methanol is a byproduct of VELCORIN addition, analysis of methanol can provide information about the success or dosage level of an addition.



Example setup for dosing VELCORIN prior to packaging. This setup can be changed depending on your production and needs.

ARTICLE

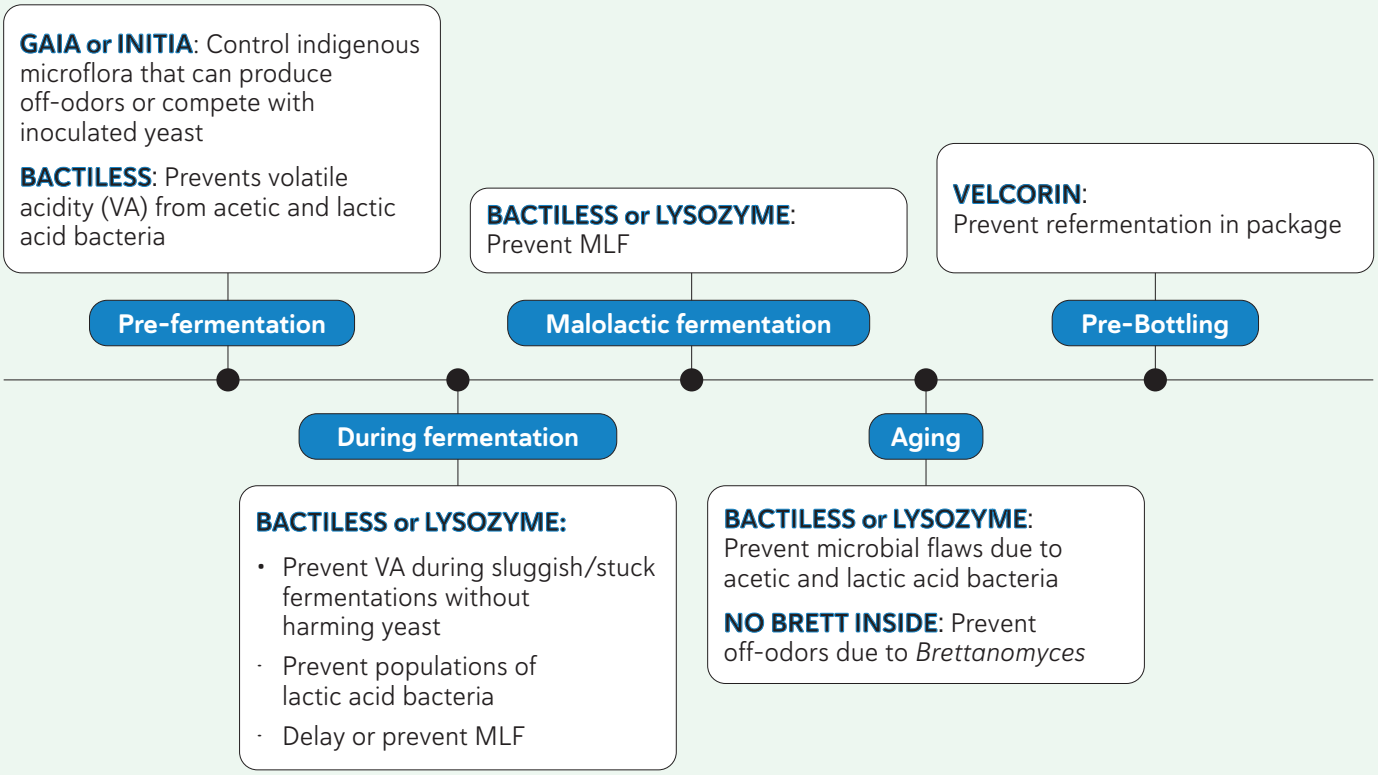
PREVENTING MICROBIAL ISSUES WITHOUT SO_2

Sulfur dioxide (SO_2) has been used for millennia to prevent microbial spoilage in food and beverages. However, there are circumstances when SO_2 cannot be used or is not effective. For example:

- Making organic or low-chemical input wines
- Wine chemistry limits effectiveness of SO_2:
  - Pre-fermentation, the antimicrobial action of SO_2 is limited because it is bound to sugar and other juice or must components.
  - Post-fermentation, the antimicrobial action of SO_2 is limited by higher pH, because pH affects how much SO_2 is in the antimicrobial (molecular) form.
- Packaging wine in aluminum cans - SO_2 must be limited throughout the winemaking process to prevent H_2S from developing once canned

WHEN TO USE SO_2 ALTERNATIVES:

Microbial spoilage occurs when unwanted microbial activity results in off-odors, off-flavors, visual flaws, and/or impedes fermentation. Unwanted microbial activity can occur at many stages of winemaking, leading to many different problems. When choosing antimicrobial alternatives to SO_2, it is important to understand what type of spoilage can occur at each winemaking stage:



HOW SO_2 ALTERNATIVES WORK:

NON-*SACCHAROMYCES* YEAST

GAIA™ and LEVEL^2 INITIA™ are non-*Saccharomyces* yeasts that are effective pre-fermentation antimicrobial agents. They outcompete indigenous organisms that can produce VA and other off-aromas, initiate alcoholic fermentation, and interfere with inoculated yeast. The antimicrobial activity of GAIA and INITIA are more effective than SO_2 pre-fermentation because SO_2 can be bound by sugar and other juice or must components.

Both GAIA and INITIA outcompete indigenous microorganisms via a phenomenon known as microbial crowding. Microbial crowding occurs when a microorganism occupies the entire ecological niche through large population numbers. INITIA will also rapidly consume large amounts of oxygen, which further deprives pre-fermentation spoilage organisms of oxygen they require for growth.

LYSOZYME

Lysozyme is an enzyme derived from egg whites that has been used in the food and beverage industry for decades. Lysozyme is compatible with low chemical input and organic winemaking. Its antimicrobial properties come from its ability to cause cell lysis in gram-positive bacteria including lactic acid bacteria.

Prior to the introduction of lysozyme to the wine industry, there was no way to target unwanted bacterial populations without affecting the activity of yeast. Lysozyme therefore opened the door to controlling the production of VA during stuck and sluggish fermentations.

CHITOSAN

Chitosan is an exciting non-allergenic and non-animal-based tool for traditional, vegan, and low chemical input winemaking. NO BRETT INSIDE® and BACTILESS™ are fungal derived (*Aspergillus niger*) chitosan-based antimicrobial agents that can be used instead of SO_2 to control *Brettanomyces* spp., lactic acid bacteria, and acetic acid bacteria. Both NO BRETT INSIDE and BACTILESS are more effective than SO_2 after fermentation, especially in high pH wines.

Chitosan is derived through the deacetylation of chitin which is naturally produced by many living organisms and is the second most abundant polysaccharide on earth after cellulose. Depending on the preparation, chitosan can vary in degree of deacetylation, thus impacting the molecules' ionic charge, molecular weight, and solubility. By changing one or more of these properties, the functionality of the chitosan molecule changes

The formulations of NO BRETT INSIDE and BACTILESS cause intense electrostatic interactions with negatively charged components on yeast and bacteria cell walls, causing them to attach to the surface of the chitosan and settle out with the product. Additionally, the chitosan can cause cell membrane damage leading to an osmotic and energy imbalance, loss of growth capacity, and eventually cell death.

VELCORIN

VELCORIN® is a powerful microbial control agent that is very effective at low dosages against a broad range of yeast, bacteria and molds. Unlike other preservatives traditionally used in wine or other specialty beverages, VELCORIN (DMDC) is non-persistent and does not affect wine taste, aromatics, or color. VELCORIN can also be used with all packaging types, including cans, where SO_2 is not compatible.

Note: These products do not completely replace the use of SO_2 - BACTILESS, GAIA, Lysozyme, NO BRETT INSIDE and VELCORIN do not offer antioxidant protection, and INITIA only offers antioxidant protection prior to fermentation.

FRUIT & MEAD

Yeast	Fruit	Mead	Pg#
LALVIN 71B®	●		23
CVW5™	●	●	28
LALVIN DV10™	●	●	29
LALVIN EC1118®	●	●	29
LALVIN ICV D47®	●		31
K1 (V1116)™	●	●	34
LALVIN ICV OKAY®	●		32
LALVIN QA23®	●	●	36
LALVIN R2™	●		37
LALVIN SENSY™	●		39
VIN 13™	●	●	40

Nutrients			
GO-FERM PROTECT EVOLUTION™	●	●	57
GO-FERM STEROL FLASH™	●	●	56
FERMAID K™	●	●	61
FERMAID O™	●	●	58

Malolactic Bacteria			
LALVIN (MBR) 31®	●		75
O-MEGA™	●		76
SOLO SELECT™	●		77

Enzymes			
LALLZYME MMX™	●		109
SCOTTZYME HC™	●		111
SCOTTZYME KS™	●		112
SCOTTZYME SPECTRUM™	●		113
SCOTTZYME PEC5L™	●		112

Tannins	Fruit	Mead	Pg#
SCOTT'TAN FT BLANC™	●		89
SCOTT'TAN FT BLANC CITRUS™	●	●	94
SCOTT'TAN FT BLANC SOFT™	●	●	89
IOC TANIN SR™	●		94
SCOTT'TAN FT ROUGE™	●		90
SCOTT'TAN FT ROUGE BERRY™	●		93
SCOTT'TAN FT ROUGE SOFT™	●		90
SCOTT'TAN RADIANCE™	●		91

Fining/Stability Agents			
BENTOLACT S™	●		120
CASÉINATE DE POTASSIUM	●		120
COLLE PERLE™	●		123
CRISTALLINE PLUS™	●	●	125
FRESHPROTECT™	●	●	120
FERMOBENT™	●		119
FLASHGUM R LIQUIDE™	●	●	127
GELOCOLLE™	●	●	124
INOCOLLE™	●		124
NACALIT PORE-TEC™	●		119
NO[OX]™	●	●	122
POLYCACEL™/POLYCEL™	●		121
QI'UP XC™	●	●	122

Yeast Derivative Nutrients			
GLUTASTAR®	●	●	62
ICV NOBLESSE™	●	●	63
OPTI-MUM RED™	●		63
OPTI-RED®	●		64
OPTI-WHITE®	●	●	64
REDULESS®	●	●	65

Making wine from sources other than grapes requires different winemaking decisions. However, many tools used in grape fermentations can also be used in fruit or mead fermentations. These tools can help create a better product and ultimately enhance product longevity.

YEAST

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

NUTRIENTS

Fruit wines and mead are notorious for having low nutrient content. Proper nutrition for both yeast and malolactic bacteria is essential to ensure good fermentation kinetics, with positive flavor and aroma profiles. Nutrients can also help to avoid stuck or prolonged fermentations and 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. REDULESS® is used to treat wines suffering from sulfur off-odors (e.g. H_2S).

MALOLACTIC BACTERIA

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

TANNINS

Tannins help give wine its structure and contribute to its longevity. Honey and some types of fruit contain very little natural tannin. Enological tannins can be used to add structure and enhance flavor and aroma. They reduce the risk of oxidation and help stabilize color. ESSENTIAL ANTIOXIDANT protects against oxidation and SCOTT'TAN™ FT BLANC SOFT adds to the midpalate texture without darkening lighter colored fruit wines and meads.

For darker meads and fruit wine, there is a whole array of complex tannins derived from oak, exotic wood, grape skins and seeds, and more. For color stabilization, there is IOC TANIN SR™, which is most effective when used in conjunction with SCOTT'TAN FT ROUGE™ or FT ROUGE SOFT™. SCOTT'TAN RADIANCE™ is an ideal tannin for a finishing touch, even just before bottling.

ENZYMES

All fresh fruit contains pectin. For many fruits, excess pectin can be responsible for inadequate juice extraction, lack of clarity, slow sedimentation, and poor filterability. Pectinases break down pectin. When pectinases are used at pressing, they result in the release of more juice. At the juice stage, enzymes speed settling of solids prior to racking and fermentation. In finished wine, pectinases aid filterability and final clarification. For most fruit wines, a combination of SCOTTZYME® PEC 5L™ and HC will work for most situations. For certain difficult situations, such as fruit compromised by rot, stronger enzymes like SCOTTZYME KS™ or LALLZYME MMX™ may be necessary. Both of these should only be used on juice or wine according to directions. Some enzymes, such as RAPIDASE REVELATION AROMA™, release aromas that are bound to sugars, thereby increasing the aromatic intensity of the wine.

FINING AGENTS

Most fining of fruit wine and mead is done for clarification. The fining agents pull minute particles together. The heavier particles then settle faster and form a more compact sediment. 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. NO[OX]™ (chitosan), CASÉINATE DE POTASSIUM (casein) and POLYCEL™ (PVPP) are effective at removing the bitterness and browning caused by oxidation of young wines. For fruit wines subject to protein instability, bentonite fining is the only way to remove the unstable proteins.

MICROBIAL CONTROL

Sulfur dioxide (SO_2), Lysozyme, 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 Tablets are premeasured, and no mixing is necessary once added to the wine. No Brett Inside specifically targets and kills *Brettanomyces*. Lysozyme attacks gram-positive bacteria, such as *Lactobacillus* spp., *Pediococcus* spp. and *Oenococcus oeni*. 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.

CHECK OUT OUR BEST PRACTICES GUIDES

We created these Scott Labs best practices guides to provide both process and product recommendations for helping winemakers work with compromised fruit and difficult winemaking conditions.

Best Practices for Working with Rot
scottlab.com/rot

Best Practices for Working with Underripe Grapes
scottlab.com/underripe

Best Practices for Juice Clarification Via Settling
scottlab.com/settling

GENERAL TOOLS & CONVERSIONS

VOLUME CONVERSIONS

mL = milliliter, fl oz = fluid ounce, gal = gallon, L = liter, hL = hectoliter

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

MASS CONVERSIONS

mg = milligram, g = gram, kg = kilogram, lb = pound

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

ONLINE UNIT CONVERSION RESOURCES

wineadds.com	winebusiness.com/tools

TEMPERATURE CONVERSIONS

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

OTHER CONVERSIONS

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

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

1 ppm = 1 mg/L

*barrel = 60 gal = 227.1 L

1°Brix = 1% sugar (wt/vol)

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

HOW TO ORDER

We're here to make your life easy! You can order from Scott Laboratories in a variety of convenient ways:

PLANNING YOUR ORDER

PDF ORDER PLANNER: To make planning your orders easy, fill out the pdf form at **scottlab.com/order-planner** before ordering online or by phone.

ORDER ONLINE AT SCOTTLAB.COM

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

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

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

LISTS: If you have groups of items that you order regularly or want to save for quick re-ordering, our Lists feature is perfect for you. You can easily create a new saved product list from a shopping cart you've assembled, offering a seamless transition from browsing to buying. Alternatively, new lists can be directly created from the "Saved Lists" page available in the "My Account" section of our site, using a handy product search and quick-add feature. When you're ready, one-click adds the entire list to your shopping cart, streamlining your purchasing process. Additionally, you can build recurring lists using the same "quick add" function on the shopping cart page, making it great for recurring purchases.

ORDER BY PHONE AT 707-765-6666

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