Anchor
OENOLOGY

PRODUCT CATALOGUE

CELEBRATING 100 YEARS OF SERVING OUR CUSTOMERS
Anchor Yeast
100
1923-2023

2023

Celebrating innovation

100 YEARS OF innovation

1974

The world's first experimental wine yeast

1975

The world's first commercially produced wine yeast

1991

The world's first commercial hybrid wine yeast: **LEGACY VIN 13**

1997

Started exporting active dried wine yeast

2008

The world's first yeast blends: **ALCHEMY I & II**

2010

The world's first *Saccharomyces paradoxus/cerevisiae* interspecies yeast hybrid: **EXOTICS MOSAIC**

The world's first bacteria blend for malolactic fermentation: **DUET AROM**

We establish our international footprint with the creation of Oenobrands, responsible for distributing the Anchor brand across the world

2018

The world's first *Saccharomyces cariocanus/cerevisiae* interspecies yeast hybrid: **EXOTICS NOVELLO**

CONTENTS

Anchor Oenology provides products that support you from grape to glass in the production of white, rosé, red and sparkling wines.

NOTE: For information on all things sparkling wine related, production, products and protocols, see our ***Base Wine To Bubbles 2023*** guide.

CHAPTER 01

ANCHOR OENOLOGY

THE TEAM

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ORDERS AND DELIVERIES

TECHNICAL SALES MANAGERS

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- **Lauren Behrens**
- **Julie de Klerk**
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ACCOUNT DETAILS

- Open an account before the harvest season to allow adequate time for a credit check.
- Banking details:

  Beneficiary: Rymco (Pty) Ltd t/a Anchor Yeast
  Bank: Nedbank
  Branch: 198765 (Industria)
  Account type: Current
  Account no.: 196-328-3910
  Reference - account holder: Account number starting with SA
  Reference - COD customers: Invoice number (delivery after proof of payment)
  Payment terms: 30 days from account statement
- Normal terms and conditions apply for all account holders, otherwise COD.

ORDERS

- **Online orders:** Place your order at www.anchoroenology.com
- **General enquiries:** 021 534 1351 | oenology@anchor.co.za
- **Email orders:** biotechorders@anchor.co.za

FINE PRINT

- No unused product will be taken back after the season.
- Products have adequate shelf-life, when stored correctly.

DELIVERY SCHEDULE DURING HARVEST

WHERE DO WE DELIVER?			WHEN DO WE DELIVER?
Vredendal	Lutzville	Klawer	Every second week
Hout Bay			Mondays & Thursdays
Somerset West Gordons Bay Hermanus Bot River Strand	Grabouw Elgin Caledon Bredasdorp Villiersdorp	Kleinmond Struisbaai Napier	Mondays, Wednesdays & Thursdays
Riebeek West Porterville Darling	Riebeek-Kasteel Hopefield Malmesbury	Moorreesburg Tulbagh	Tuesdays *(if order is placed by Friday)*, Wednesdays & Fridays
Constantia	Noordhoek		Wednesdays, Thursdays & Fridays
Wellington Paarl Franschhoek Muldersvlei Klapmuts Rawsonville	Worcester Bonnievale Montagu Swellendam Breedekloof Ashton	Durbanville	Daily

CERTIFICATION & DOCUMENTATION

- **Enquiries:** Your Technical Sales Manager
- **Download:** Visit www.anchoroenology.com

CONTACT US

- **Enquiries:** 021 534 1351 | oenology@anchor.co.za
- **Website:** www.anchoroenology.com (order online)
- **Facebook:** @AnchorOenology

CHAPTER 02

PRODUCTS TO IMPROVE FERMENTATION

INTRODUCTION

NUTRITIONAL NEEDS OF THE YEAST

NITROGEN - the key nutrient

- Strongly impacts the yeast population.
- Impacts the fermentation kinetics.
- Impacts the organoleptic quality of the finished wine.

Organic nitrogen

- Source: autolysed yeast.
- Twice as effective as inorganic nitrogen in terms of fermentation kinetics.
- Amino acid precursors of thiol and ester aromas.
- Can be used in organic and NOP winemaking since 2019.

Inorganic or mineral nitrogen

- Diammonium phosphate (DAP) or diammonium sulphate (DAS).
- Suitable nutrient after the first third of alcoholic fermentation.

ERGOSTEROL - the most important lipid

- Indispensable to the yeast because it is an essential component of the yeast cell membrane.
- Maintains the membrane fluidity (resistance to ethanol, enhanced fermentation capacity).
- Ergosterol deficiency can lead to: the inability of the yeast to utilise organic nitrogen; a low yeast population; slow or stuck alcoholic fermentation.
- Severe clarification can increase the risk of sterol deficiency.
- Natural source: yeast autolysates.

VITAMINS (B1, B3, B5 and B8)

- Thiamine (B1): The only vitamin authorised for direct addition.
- Biotin (B8), pantothenate (B5) and nicotinic acid (B3) are naturally present in yeast autolysates.
- Necessary for yeast multiplication.
- Indispensable for maintaining yeast viability when the must is very rich in assimilable nitrogen.

MINERALS (magnesium and zinc)

Magnesium

- Key role in glycolysis (enzymatic cofactor).
- Responsible for yeast resistance to high alcohol levels.

Zinc

- Essential for glycolysis/alcoholic fermentation.
- Makes the yeast more resistant to stress.
- Improves the yeast fermentation capacity.
- Increased production of fermentation aromas.
- Natural source: yeast autolysates.

TYPE OF COMMERCIAL PRODUCTS

Commercially available yeast nutritional options have undergone an evolution, shifting from the exclusive use of DAP to the wide variety of products currently available. These include:

REHYDRATION NUTRIENTS

- Mainly inactivated yeast supplemented with either minerals or vitamins or both.
- Contains no ammonium salts.
- Cell membranes damaged during inactivation allow vitamins, minerals, amino acids and nucleic acids to 'leak' out of the cells. These can enhance fermentation efficiency and aroma and flavour production.
- *When to use:* Juice with a very low YAN; stressful must conditions; to enhance volatile aroma production.

REHYDRATION PROTECTANTS

- Partially autolysed inactivated yeast.
- Partial autolysation makes sterols in the cell membrane more readily available for the fermenting yeast.
- Enhance tolerance to alcohol.
- *When to use:* Together with certain yeast strains when used under stressful fermentation conditions (low/high fermentation temperatures and high sugar musts); providing vitamins and minerals to fermenting yeast.

COMPLEX YEAST NUTRIENTS

- Mainly consist of inactivated yeast and ammonium salts (DAP/DAS).
- Good source of vitamins and minerals.
- Can be enriched with added vitamins (usually thiamine) and minerals (usually magnesium).
- High concentration of organic nitrogen (amino acids).
- *When to use:* To support yeast strains with high nutritional requirements; low YAN musts; to prevent sluggish fermentations; to prevent the production of sulphur off-odours.

YEAST HULLS

- Good adsorption capacity to bind to toxic medium chain fatty acids.
- Detoxification of fermentation environment.
- If part of the cell membrane is included, they can be a good source of sterols and lipids.
- *When to use:* Prevent or treat sluggish or stuck fermentations via detoxification; prevent sluggish/stuck malolactic fermentation; treat tainted wines (removal of cork-taint anisoles and Ochratoxin A).

The selection of yeast strain and specific fermentation conditions will dictate which product(s) is/are more suitable to use.

CATALOGUE

GLUTATHIONE SOLUTIONS

In must and wine, glutathione is present in the reduced form (GSH) or the oxidised form (GSSH) (two glutathione molecules linked with a sulphide bridge). Only the reduced GSH form has highly effective anti-oxidant properties that can positively influence wine aroma, longevity and quality. The natural GSH concentration in must is dependent on the grape variety, viticultural practices and winemaking practices.

Anti-oxidative mechanisms

- Caftaric acid is one of the main phenols in must that is most susceptible to oxidation.
- GSH can react with caftaric acid via its -SH group.
- This reaction forms the Grape Reaction Product (GRP).
- This GRP is stable and colourless.

Due to the fact the GSH naturally present in the wine is highly sensitive to oxidation, research has shown that it is beneficial to supplement the must with additional glutathione. Whilst the use of pure glutathione in wine production is not approved, glutathione-rich inactivated yeast is approved for use. Although inactivated yeasts are intact cells, their cell membranes that are responsible for regulating the flow of molecules in and out of the cell, are damaged due to the inactivation process. Small molecules like vitamins, minerals, amino acids and GSH, can leak out and have a positive impact on the wine. The glutathione accumulated intracellularly during the production process of the inactivated yeast is then released in the must.

Benefits of increased glutathione levels during winemaking

- Increased colour stability and protection in white and rosé wines.
- The preservation of volatile thiols during ageing.
- Significant increase in esters and terpenes.
- More aroma intensity and balance.
- Increased longevity of the wine with a decrease in the loss of fruity aromas.
- Increased volume and mouthfeel due to the release of polysaccharides.

Addition of glutathione-rich inactivated yeast

Research has shown that the best results with glutathione-rich inactivated yeast are reported when additions take place in the early stages of alcoholic fermentation. It is also important to ensure that the yeast has sufficient nutrition in the forms of organic and inorganic nitrogen, to avoid the yeast using glutathione as a nutrient source.

IOC GLUTAROM

Early preservation and protection of aroma in white and rosé wines.

- Glutarom is a specific nutrient based on inactived yeasts rich in glutathione and polysaccharides. Due to its formulation and preparation process, it protects against oxidation and loss of aroma.
- Application: Prevents the oxidation of polyphenols; grape varieties with low levels of glutathione will be better protected against oxidation; enhances varietal thiols; ensures the rapid release of yeast polysaccharides that will protect and stabilise aromas over time; add at the start of alcoholic fermentation or even before yeast inoculation; in the case of sluggish fermentation, consider a late addition in order to preserve the aromas in musts more vulnerable to oxygen.
- Dosage: 15 - 30 g/hL
- SKU: 1 kg

YEAST REHYDRATION

ANCHORFERM

Enhance yeast viability.

- A rehydration nutrient to increase yeast viability and fermentation capabilities.
- Composition: Inactivated yeast and thiamine.
- Application: Thiamine stimulates yeast growth and metabolism; inactivated yeast are rich in vitamins and minerals and other trace elements required for optimum yeast performance, as well as reducing the risk of stuck fermentation and off-odours; sterols and long chain fatty acids improve alcohol tolerance.
- Dosage: 20 g/hL
- SKU: 1 & 5 kg

ANCHOR REVIVE

Enhance yeast viability and wine quality.

- A 100% yeast-derived formulation that provides high levels of essential growth factors like vitamins (pantothenate and biotin) and minerals that act as enzymatic co-factors (magnesium, manganese and zinc).
- Composition: Inactivated and autolysed yeast.
- Application: Improve yeast acclimatization, implantation, viability and metabolism; enhanced fermentative aromas due to optimised yeast metabolism; precursor assimilation optimise the release of varietal aroma compounds by the yeast.
- Dosage: 30 g/hL
- SKU: 1 & 5 kg

NUTRITION

Determine the nitrogen deficiency for a yeast with moderate requirements, based on the YAN of the must and the potential alcohol content:

ASSIMILABLE NITROGEN OF THE MUST	POTENTIAL ALCOHOL CONTENT			
	< 12.5%	12.5 - 13.5%	13.5 - 14.5%	> 14.5%
> 200 mg/L	No deficiency	No deficiency	Low	Moderate
150 - 200 mg/L	No deficiency	Low	Moderate	High
120 - 150 mg/L	Low	Moderate	High	Very high
90 - 120 mg/L	High	High	Very high	Very high
< 90 mg/L	Very high	Very high	Extreme	Extreme

Organic

IOC ACTIVIT NAT

Organic source of amino acids and vitamins.

- Activit Nat is a fermentation activator that provides amino acids, small peptides and stress resistance factors that are absorbed by the yeast throughout alcoholic fermentation. This activator is intended for musts with low or moderate nitrogen deficiencies.
- Composition: Inactivated yeast.
- Application: Balanced alcoholic fermentation; completion of alcoholic fermentation; contributes to organoleptic quality of the wine; reduces the risk of the production of sulphur compounds; enhance varietal thiols.
- Dosage: 20 - 40 g/hL
- SKU: 1 kg

NATUFERM PURE

A nutrient source of organic nitrogen.

- A nutritional source that is especially suitable in the case of nitrogen deficiency and/or high potential alcohol percentage.
- Composition: Autolysed yeast.
- Application: Ensures regular, complete alcoholic fermentation; ensures the yeast can withstand nitrogen deficiencies and/or must with high potential alcohol; preserves and enhances the aromatic typicity of grape varieties; contributes to the biosynthesis of esters; high in amino acids; high in trace elements.
- Dosage: 20 - 40 g/hL (depending on the must's initial YAN content and/or potential alcohol strength).
- SKU: 1 kg

NATUFERM BRIGHT

Enhanced aroma production in white and rosé wines.

- Natuferm Bright is very high in amino acids (aroma precursors), which play an important role in assisting the yeast in the release of thiols during alcoholic fermentation. Its high ergosterol content, essential for yeast cell functioning, also make it a suitable nutrient for challenging fermentation conditions.
- Composition: Autolysed yeast.
- Application: Promotes the release of aromatic thiol and ester compounds; maintains the ability of the yeast to ferment sugars; corrects small assimilable nitrogen deficiencies.
- Dosage: 20 - 40 g/hL
- SKU: 1 kg

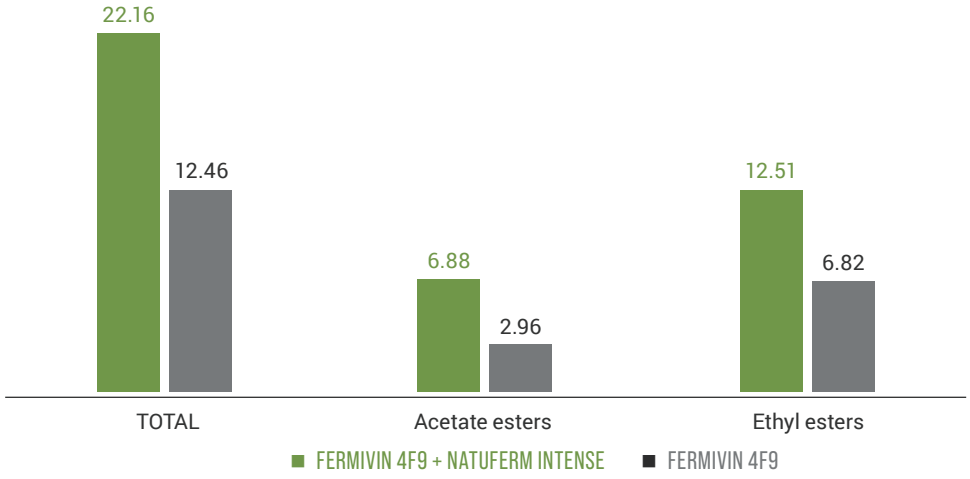
NATUFERM INTENSE

Enhanced aroma intensity and complexity in white and rosé wines.

- Natuferm Intense is a yeast derivate naturally rich in amino acids, vitamins, zinc and magnesium. It supports yeast in the production of qualitative wines.
- Composition: Inactivated and autolysed yeast.
- Application: Enhances the aroma intensity and complexity by promoting the production of esters and acetates during alcoholic fermentation; enriches wine with ethyl esters, stable aromas over time and preserves the fruitiness; improves the complexity and mouthfeel, as if wine was aged on lees; ensures a steady kinetic for regular growth of biomass, avoiding yeast starvation and stuck fermentation; adapted to barrel fermentation.
- Dosage: 40 g/hL
- SKU: 1 kg

A Muscat wine is treated with NATUFERM INTENSE in comparison with other commercial co-inoculation cultures (South African Cabernet Sauvignon).

Positive volatile aroma compounds in OAV.



NATUFERM FRUITY

Enhanced fruitiness in red wines.

- Natuferm Fruity is selected for its richness in amino acids that act as precursors for the production of ester aromas during alcoholic fermentation.
- Composition: Autolysed yeast.
- Application: Provides organic nitrogen, an efficient form of YAN to ensure achievement of fermentation; rich in ergosterols to preserve yeast membrane fluidity and viability until the end of fermentation; naturally rich in vitamins; naturally rich in amino acids, precursors of fruity esters; tendency to preserve PDMS to increase the longevity of fruity aromas and impact the qualitative ageing aromas of the wine; efficient fermentation avoids the formation of unwanted reductive aromas.
- Dosage: 20 - 40 g/hL
- SKU: 1 kg

A Shiraz fermented with and without NATUFERM FRUITY. The use of this product, an organic nutrient supplying a rich pool of amino acid precursors, leads to a significant increase in the fruity character of the wine.

Fruity aromas in the wine

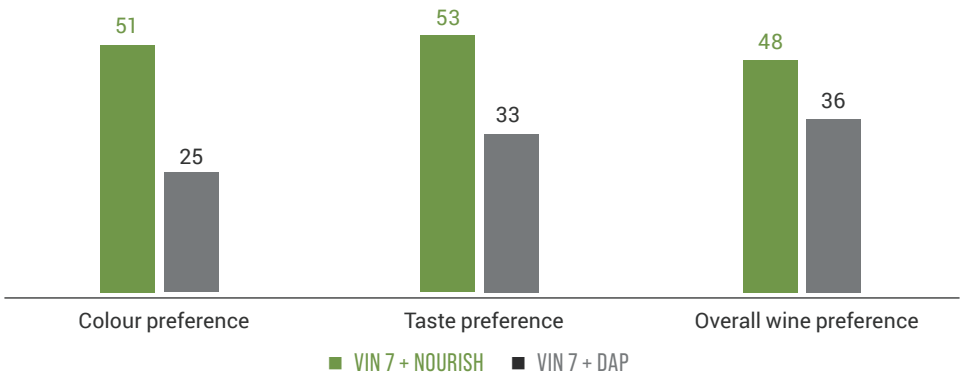
Complex

ANCHOR NOURISH

Complete fermentation and quality yeast performance.

- Nourish is a formulation that provides a complex source of organic and inorganic nitrogen during fermentation. It also delivers essential vitamins, minerals, trace elements, amino acids and stress resistance factors like sterols and unsaturated fatty acids.
- Composition: Inactivated yeast, DAP and thiamine.
- Application: Regulated yeast growth, maintain membrane permeability and improve alcohol tolerance; compensate for nitrogen deficient must; reduce the risk of sluggish or stuck fermentations; ensure efficient, balanced and complete alcoholic fermentation; provide optimal nutrition that allow for greater aroma intensity, balance and complexity; result in fresher, fruitier and less vegetal wine aromas; improve overall wine quality.
- Dosage: 20 - 40 g/hL
- SKU: 1 & 5 kg

Ranking preference test with VIN 7 with NOURISH compared to DAP.



ANCHOR CONQUER

Secure fermentation under challenging conditions.

- Conquer is a complete and complex nutrient formulation that ensures optimal yeast nutrition, especially for more challenging fermentation conditions.
- Composition: Inactivated and autolysed yeast, DAP and thiamine.
- Application: Survival factors ensure the optimal functionality of the cell, especially under stressful fermentation conditions; ensure a balanced and complete fermentation; avoid sluggish or stuck fermentations; provide essential elements that reduce stress responses from the yeast; prevent the formation of undesirable metabolic by-products.
- Dosage: 20 - 40 g/hL
- SKU: 1 & 5 kg

Total quality-enhancing volatile aroma compounds (mg/L). With CONQUER, aroma production is increased by up to 40%, compared to a competitor product or DAP.

IOC ACTIVIT

Prevent and treat nutrient deficiencies.

- A mixture to be used during a sluggish alcoholic fermentation and it will also maintain the fermentation when there is a nitrogen deficiency in the must.
- Composition: Inactivated yeast, DAP and thiamine.
- Application: Provides inorganic and organic nitrogen; adsorption of short chain fatty acids that can inhibit fermentation; provides sterols and long chain fatty acids which are essential precursors in maintaining yeast viability; provides vitamins and minerals to ensure uniform yeast development.
- Dosage: 20 - 40 g/hL (preventative treatment and mid-fermentation) or 40 - 50 g/hL (restart a stuck fermentation).
- SKU: 1 kg

DETOXIFICATION & PROTECTION

EXTRAFERM D'TOX PREVIOUSLY "EXTRAFERM"

Remove unwanted compounds from must.

- Consists of pure yeast hulls able to improve wine quality by adsorbing toxic compounds from must and wine.
- Composition: Yeast hulls.
- Application: Removal of medium chain fatty acids that could negatively impact the viablity of the yeast; enhance fermentation capabilities of the yeast.
- Dosage: 20 - 40 g/hL
- SKU: 1 kg

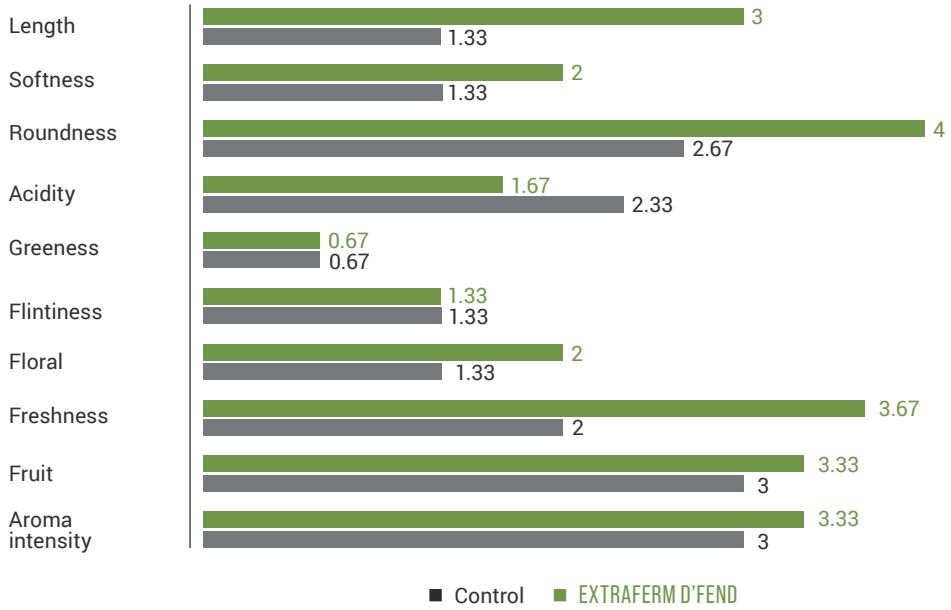
Medium chain fatty acids (C_6, C_8 and C_{10}) can negatively influence the alcoholic and malolactic fermentations by interfering with the ability of the cell to take up substrates, as well as negatively influence the growth of the yeast and bacteria. A dosage of 20 g/hL EXTRAFERM D'TOX can reduce the fatty acid concentration by almost 30%.

EXTRAFERM D'FEND NEW

Protects against oxidation.

- A unique blend of inactivated and autolysed yeast, rich in antioxidant nucleophilic compounds. It preserves fruit and freshness, clean aromas over time and the palate is round and full.
- Composition: Inactivated and autolysed yeast.
- Application: Protects white and rosé wines from oxidation; immediate and long-lasting protective effect during wine ageing; gives roundness to wines, the aromas are clean, the palate is persistent and fuller bodied; prevents oxidation of wines with low or no SO_2, during ageing and storage; Extraferm D'fend should be added just before the end of alcoholic fermentation or to the wine.
- Dosage: 20 - 30 g/hL
- SKU: 1 kg

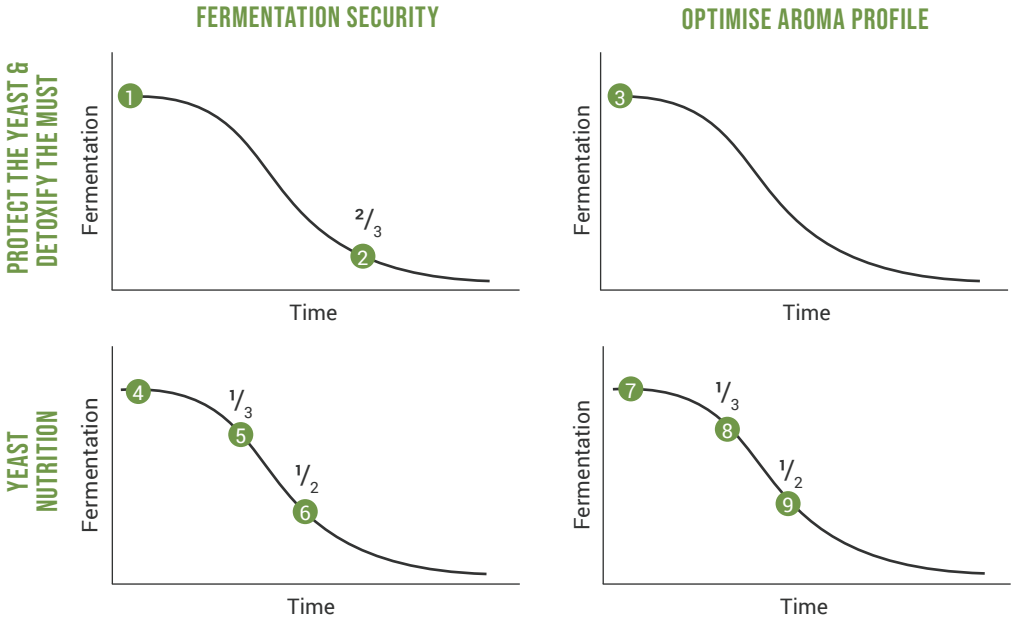
Tasting Chablis with EXTRAFERM D'FEND compared to a control batch.



PRACTICAL CONSIDERATIONS

APPLICATIONS (see reference numbers in graphs)

1. **Rehydration:** 20 g/hL ANCHORFERM.
2. **At $^2/_3$ of fermentation:** 20 - 40 g/hL EXTRAFERM D'TOX
3. **Rehydration:** 30 g/hL REVIVE.
4. **At the beginning of fermentation:** 20 - 30 g/hL ACTIVIT (red must).
5. **During $^1/_3$ of fermentation:** 20 - 40 g/hL NATUFERM PURE (normal conditions) **OR** 20 g/hL CONQUER (challenging conditions).
6. **At $^1/_2$ of fermentation:** 20 g/hL CONQUER (challenging conditions).
7. **At the beginning of fermentation:** 15 - 20 g/hL NATUFERM BRIGHT (white & rosé must) **OR** 40 g/hL NATUFERM INTENSE (white & rosé must) **OR** 20 - 40 g/hL NATUFERM FRUITY (red must) **AND** 20 g/hL NOURISH (if organic nutrition is insufficient).
8. **During $^1/_3$ of fermentation:** 15 - 20 g/hL NATUFERM BRIGHT (white & rosé must).
9. **At $^1/_2$ of fermentation:** 20 g/hL NOURISH (when organic nutrition is insufficient).



PRODUCT SUMMARY

APPLICATION	FERMENTATION IMPROVEMENT PRODUCTS	Nitrogen source		Added assimilable nitrogen (mg/L) for 40 g/hL dosage		Fermentation enhancers of yeast origin					Added
		Organic	Mineral	Direct calculation	Kinetic equivalent	Amino acids	Peptides	Sterols & lipids	Minerals	Vitamins	Thiamine
YEAST REHYDRATION	ANCHORFERM	■		4	7	■	■	■	■	■	■
	ANCHOR REVIVE	■		n/a	n/a			■	■		
YEAST NUTRITION	IOC ACTIVIT NAT (O)	■		17	45	■	■	■	■	■	
	NATUFERM PURE (O)	■		5	13	■	■		■	■	
	NATUFERM BRIGHT (O)	■		14	37	■	■		■	■	
	NATUFERM INTENSE (O)	■		8	20	■	■		■	■	
	NATUFERM FRUITY (O)	■		14	37	■	■		■	■	
	ANCHOR NOURISH (C)	■	■	42	46	■			■	■	■
	ANCHOR CONQUER (C)	■	■	46	51	■	■	■	■	■	■
	IOC ACTIVIT (C)	■	■	52	56	■			■	■	■

(O) = Organic | (C) = Complex

CHAPTER 03

YEAST FOR ALCOHOLIC FERMENTATION

INTRODUCTION

The reason for the selection of a commercial, cultivated yeast culture for inoculation, is the fact that they are very well characterised in terms of their sensory contributions during the fermentation. Significant compounds produced during fermentation include thiols, esters, higher alcohols, volatile acids, aldehydes and terpenes. Research has shown that the yeast has a distinct influence on the final wine aroma profile and the long term effects are only detectable 6 - 12 months after fermentation.

SPONTANEOUS FERMENTATIONS

- Require excellent fruit quality (no rot, spoilage, damage or split berries).
- More time consuming.
- Difficult to control/predict.
- Greater risk of stuck/sluggish fermentations.
- Perceived to be a more accurate reflection of *terroir*.
- Less repeatability from vintage to vintage.
- Different yeast populations can add to complexity, texture and mouthfeel.
- Larger risk for spoilage.

INOCULATED FERMENTATIONS

- Controlled and complete fermentation process.
- Consistent style and quality.
- Shorter lag phase and duration of fermentation.
- Sluggish or stuck fermentations unlikely.
- More tolerant to grape defects and nutritional deficiencies.
- More temperature and SO_2 tolerant.
- Enhanced aromatics, colour and varietal characteristics.
- Predictable sugar to alcohol conversion rate.

YEAST MECHANISMS FOR MODIFYING WINE AROMA AND FLAVOUR

- Secreting enzymes that liberate aroma-active compounds from precursors.
- Transforming existing grape-derived compounds to aroma-active compounds.
- Synthesising aroma compounds (*de novo*).
- Releasing macromolecules (mainly during autolysis).

With so many options and constant innovations in the area of fermentation, it is important to focus on selecting the correct yeast strain for a specific application. In order to do this, consider the variety/cultivar, the desired style of wine and the fermentation conditions/technical parameters.

CATALOGUE

Anchor Oenology provides you with three distinct ranges: Anchor, Fermivin and IOC. **Anchor** is selected and developed for the South African industry and the new-world style of wine production. **Fermivin** provides the winemaker with a more traditional option, focusing on yeast strains that were mainly selected from Europe and for producing more varietal-style wines. **IOC** yeast focuses on the production of unique and technical sparkling and still wines.

BIOPROTECTION

IOC GAÏA

[LOW SO_2 WINES]

Bioprotection for grapes and must.

- *Metschnikowia fructicola*.
- Sensory: Neutral.
- Application: All varieties; prevent alcoholic fermentation and spoilage.
- Notes: Reduce pre-fermentation sulphiting; combat natural harmful microflora; facilitates the implantation of selected *S. cerevisiae* starter culture; provides microbial security during grape harvest transport, pre-fermentation maceration, maceration, clarification, cold storage, transport of must and air-drying of grape bunches.
- Dosage: 7 - 20 g/hL
- SKU: 500 g

WHEN AND HOW TO USE GAÏA

- **At the machine during mechanical harvesting:**
  Protect your grapes as early as possible.
  To avoid any proliferation of microorganisms from the harvest and during transport to the cellar.
- **During transport of handpicked grapes:**
  Manage long transport times.
  Suitable for temperatures >15 °C, long transport times, extended waiting times and degraded sanitary conditions.
- **On the grapes during drying:**
  Limit development of Botrytis cinerea *during drying process (e.g. Amarone).*
  Reduces the development of rot often observed in the drying chambers.
- **At the reception of grapes in the cellar:**
  Protect the must for the duration of the pre-fermentation stages.
  Prevents the activity of spoilage microorganisms or the early start of fermentation.
- **When filling cold pre-fermentation maceration tanks:**
  Fight against rising volatile acidity while limiting the start of fermentation.
  Fight against *Hanseniaspora uvarum* with limited fermentation start, allowing for extraction of anthocyanins during skin contact.
- **In the press:**
  Limit the risks of starting fermentation and reduce SO_2 additions.
  Limits the development of fermentative yeasts, especially in the case of lower SO_2 additions, to allow for good clarification after pressing.
- **After the pressing of white juice for sparkling wines (traditional method):**
  Limit spoilage and control the sensory profile.
  With global warming, increased pH levels and the desire to limit SO_2 concentrations, an addition of Gaïa at the beginning when filling the settling tank can help to reduce yeast or acetic acid bacteria growth and limit unwanted aromatic development that will harm the elegance and finesse of sparkling wines made in the traditional method.
- **During the maceration of white and rosé must:**
  To limit the risk of fermentation starting and to reduce SO_2 usage.
  Limits the development of fermentative yeasts, especially in the case of reduced sulphur levels or too high temperatures, or in the case of delayed processing.
- **Before yeast inoculation, on must used to produce sparkling wines through the Charmat method:**
  Avoid the start of fermentation and the production of ethanal during must warming.
  During this very specific process, the warming of the must (stored at cold temperature) can last up to 72 hours and can cause the development of wild microorganisms as a source of ethanal. The addition of Gaïa in the cold must before starting the process can avoid this.
- **On the juice during storage:**
  Protection of juice during storage or transport over extended periods.
  Maintain the juice in an optimal condition for use during the year and to reduce expenses (e.g. refrigeration, filtration), as well as to avoid unwanted fermentation.

NON-*SACCHAROMYCES*

FERMIVIN VINEAE NEW

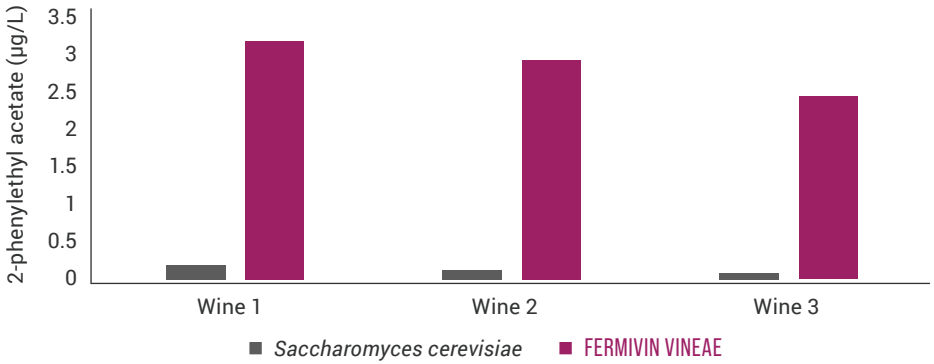
Floral, complex, aromatic wines with mouthfeel and volume.

- A *Hanseniaspora vineae* yeast for white, rosé, red, sparkling wines and ciders to increase aroma (rose, white floral), complexity and texture.
- Application: Produces ten times more phenylethyl acetate and two times more benzenoids which boosts the aroma profile; lysis is about six times faster, this reduces the lees ageing time (compared to *S. cerevisae*).
- Dosage: 20 g/hL
- SKU: 500 g

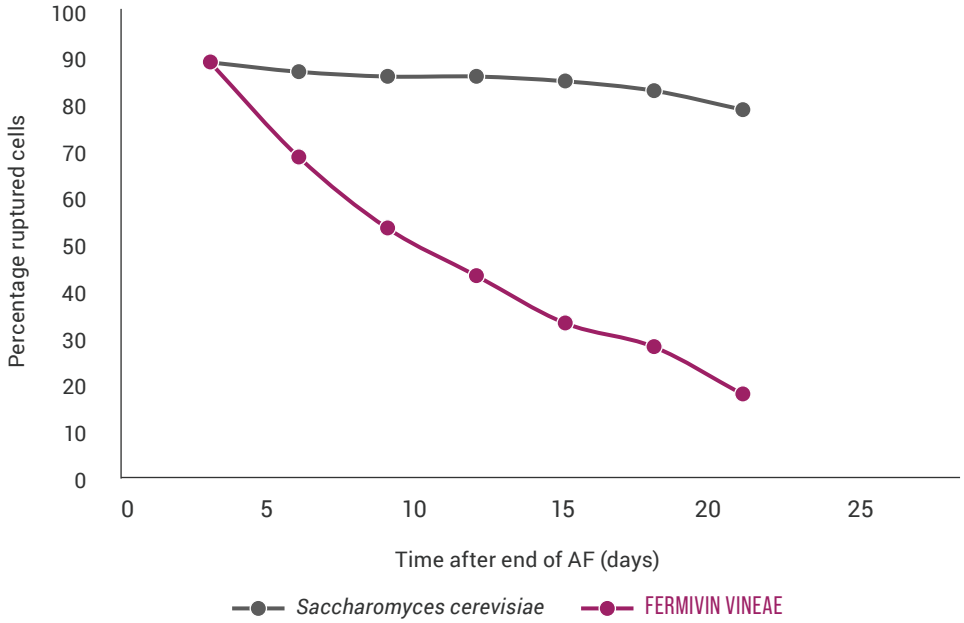
WINEMAKING WITH FERMIVIN VINEAE

- This yeast ferments till 10% alcohol, whatever the YAN level is. After two thirds of fermentation, it is recommended to inoculate a *Saccharomyces cerevisiae* yeast to complete the alcoholic fermentation.
- The addition of thiamine will optimize the production of ester aromas.
- The high production of 2-phenylethyl acetate creates aromatic wines, even in neutral varieties.
- Fast autolysis means the strain is well adapted for lees ageing and barrel fermentation.
- The addition of DAP will drastically reduce the viability of this yeast. ONLY ADD DAP after the addition of the selected *S. cerevisiae* strain. This will induce autolysis of the Fermivin VINEAE and as a result hasten its contribution to the mouthfeel.

2-Phenylethyl acetate production with **FERMIVIN VINEAE** compared to *Saccharomyces cerevisae* yeast strains.



Yeast autolysis with **FERMIVIN VINEAE** , in comparison with other yeast strains used.



WHITE AND ROSÉ WINE

EXOTICS MOSAIC

Iconic, barrel-fermented white and rosé wines with intense mouthfeel.

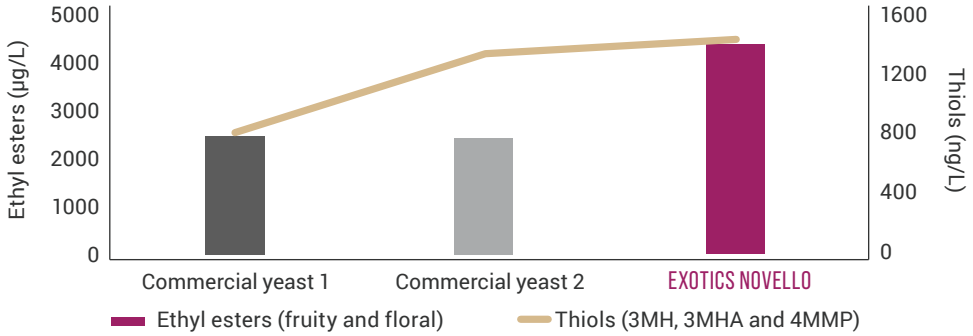
- *S. cerevisiae* x *S. paradoxus* hybrid.
- Sensory: Guava, granadilla, grapefruit, tropical fruit salad and stone fruit.
- Application: Chenin blanc, Chardonnay and Viognier; rosé wines.
- Notes: Fermentations above 18 °C; high glycerol production; good mouthfeel; fructophilic; pectolytic activity.
- Dosage: 30 g/hL
- SKU: 250 g

EXOTICS NOVELLO

Iconic, fresh and fruity white and rosé wines with thiol aromas.

- *S. cerevisiae* x *S. cariocanus* hybrid.
- Sensory: Fruity and floral esters, with enhanced thiol aromas of granadilla and guava.
- Application: Sauvignon blanc, Chenin blanc and Colombard; rosé wines.
- Notes: Cold tolerance of 15 °C; enhanced softness; increased complexity, balanced with freshness.
- Dosage: 30 g/hL
- SKU: 250 g

Aroma impact of **EXOTICS NOVELLO** in Sauvignon blanc.



ALCHEMY I

White wines with fruity and floral esters.

- Yeast blend.
- Sensory: Fruity and floral esters, tropical fruit and citrus aromas and some volatile thiols such as granadilla, grapefruit, gooseberry and mango aromas add to complexity.
- Application: Tank fermentations of Sauvignon blanc, Chenin blanc, Chardonnay, Viognier, Riesling and Pinot gris.
- Notes: Cold fermentation; high alcohol tolerance.
- Dosage: 20 g/hL
- SKU: 1 kg

ALCHEMY II

White wines with volatile thiols.

- Yeast blend.
- Sensory: Granadilla, grapefruit, gooseberry and guava.
- Application: Tank fermentations of Sauvignon blanc, Chenin blanc and Colombard.
- Notes: Cold fermentation; high alcohol tolerance; New Zealand style Sauvignon blanc.
- Dosage: 20 g/hL
- SKU: 1 kg

ALCHEMY IV

Rosé wines with intense red fruit aromas.

- Yeast blend.
- Sensory: Red fruit aroma intensity like cherry, raspberry, redcurrant and pomegranate, rounded and smooth wines.
- Application: All varieties.
- Notes: Stable esters; wines to be aged; terpenes produced; masks green characters.
- Dosage: 30 g/hL
- SKU: 1 kg

LEGACY VIN 2000

Full-bodied white wines with good mouthfeel.

- *S. cerevisiae* x *S. cerevisiae* hybrid.
- Sensory: Fresh pineapple, papaya, grapefruit, tropical fruit and citrus, as well as floral.
- Application: Chardonnay, Chenin blanc and Viognier.
- Notes: Steady fermentation rate; high alcohol tolerance; fructophilic; also suitable for barrel fermentations.
- Dosage: 20 g/hL
- SKU: 1 kg

LEGACY VIN 13

[RESTART]

Aromatic white and fruity rosé wines.

- *S. cerevisiae* subsp. *cerevisiae* x *S. cerevisiae* subsp. *bayanus* hybrid.
- Sensory: Fresh fruit salad, pineapple, floral; red fruit in rosé.
- Application: All white varieties; rosé wines.
- Notes: Robust and aromatic; fast fermentation rate; extremely sugar, alcohol and cold tolerant; restart stuck fermentations; good mouthfeel at low fermentation temperatures in rosé production.
- Dosage: 20 g/hL
- SKU: 1 kg; available on pre-order: 5 & 10 kg

LEGACY VIN 7

Thiolic white wines.

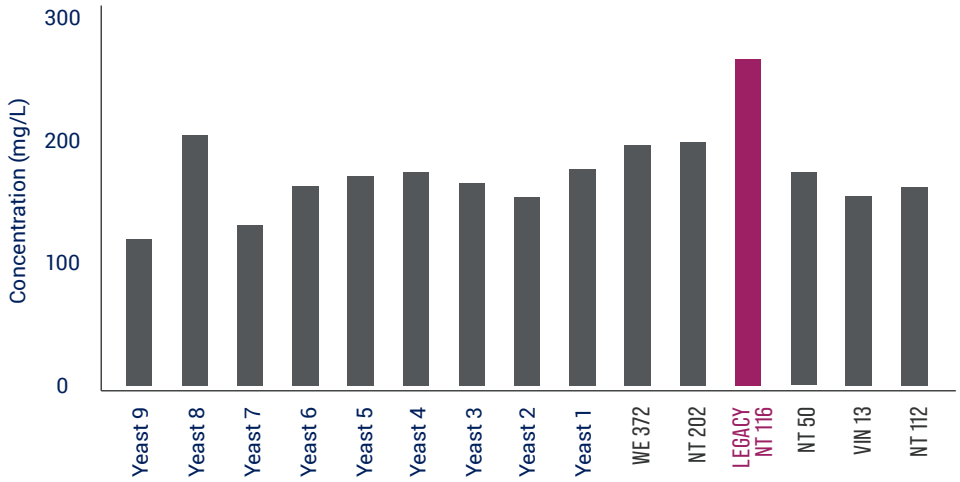
- *S. cerevisiae* (diploid) x *S. kudriavzevii* (haploid) hybrid.
- Sensory: Guava, granadilla, grapefruit and gooseberry.
- Application: Sauvignon blanc, Chenin blanc and Colombard.
- Notes: Can foam and produce volatile acidity under stress conditions; ensure sufficient complex nutrition and temperature control; enhanced 4MMP release.
- Dosage: 20 g/hL
- SKU: 1 kg; available on pre-order: 5 & 10 kg

LEGACY NT 116

Crisp, aromatic white and fruity rosé wines.

- *S. cerevisiae* x *S. cerevisiae* hybrid.
- Sensory: Tropical fruit salad, zesty citrus and volatile thiols, like guava and gooseberry aromas, enhances neutral varieties.
- Application: Chenin blanc, Chardonnay, Colombard and Pinot gris; rosé wines.
- Notes: High sugar, alcohol and cold tolerance; intense ester production.
- Dosage: 20 g/hL
- SKU: 1 kg; available on pre-order: 5 & 10 kg

Mannoprotein release by **LEGACY NT 116**.



LEGACY WE 14

Natural sweet white wines.

- *S. cerevisiae*.
- Sensory: Neutral sensory contribution in white wines.
- Application: All white varieties for sweet wine production.
- Notes: Resistant to *Botrytis cinerea* toxins; cold sensitivity allows for the arrest of fermentation at the desired sugar concentration.
- Dosage: 30 g/hL
- SKU: 1 kg

LEGACY N 96

Strong fermenting, all-purpose wine yeast.

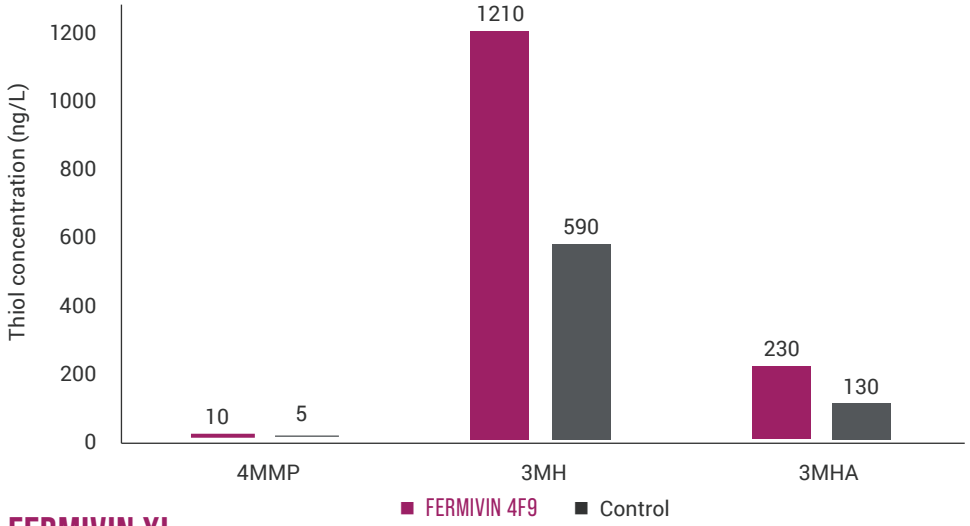
- *S. cerevisiae* subsp. *bayanus*.
- Sensory: Neutral sensory contribution allows varietal character to dominate.
- Application: All white varieties, Cap Classique base wines and cider production.
- Notes: Robust and respects varietal character.
- Dosage: 20 g/hL
- SKU: 1 kg; available on pre-order: 5 kg

FERMIVIN 4F9

Fruity white and rosé wines with a long finish.

- *S. cerevisiae* subsp. *bayanus*.
- Sensory: Intense, exotic fruit, guava, granadilla, well-balanced and round on the palate.
- Application: All white varieties, especially Sauvignon blanc, Chardonnay and Viognier; wines to be aged on fine lees; thiol-styled rosé wines.
- Notes: For improvement of wine body and volume; good thiol converter; ester production.
- Dosage: 20 g/hL
- SKU: 500 g

FERMIVIN 4F9 is an excellent releaser of thiols and converter of 3MH into its more aromatic intense acetate ester, 3MHA.



FERMIVIN XL

Red-berry style rosé wines.

- *S. cerevisiae*.
- Sensory: Red and black fruits, low astringency; roundness on the palate and balance.
- Application: All varieties, especially Cabernet Sauvignon and Merlot.
- Notes: Adsorbs astringent tannins and increases softness.
- Dosage: 20 g/hL
- SKU: 500 g

IOC 18-2007

[RESTART]

Enhances varietal aromas.

- *S. cerevisiae*.
- Sensory: Neutral.
- Application: All white varieties.
- Notes: Fermentation under difficult conditions (low temperature and pH; high alcohol); restarting stuck fermentations; respects varietal character.
- Dosage: 20 g/hL
- SKU: 500 g

IOC B 2000

Fresh and aromatic white and rosé wines.

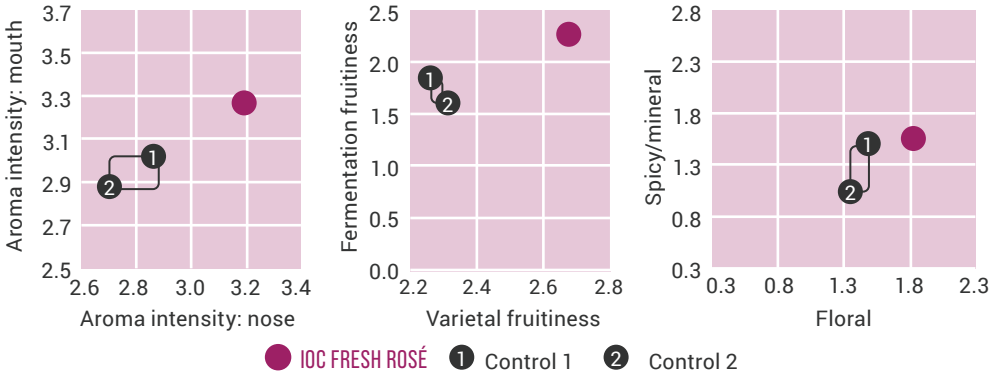
- *S. cerevisiae*.
- Sensory: Ester aromas, varietal notes, intense fruity and fresh bouquet.
- Application: All white varieties; rosé wines from Shiraz, Grenache, Merlot and Cabernet Sauvignon.
- Notes: Use for grapes weak in naturally occurring aromatic precursors; respects varietal character; exotic fruits and citrus aromas in rosé wines.
- Dosage: 20 g/hL
- SKU: 10 kg

IOC FRESH ROSÉ

Complex and round rosé wines.

- *S. cerevisiae*.
- Sensory: Floral, citrus, spice and varietal characters.
- Application: Shiraz and Cabernet Sauvignon.
- Notes: Contributes to mouthfeel; reduces aggressive sensations like acidity, dryness and bitterness; expresses the varietal notes; floral notes.
- Dosage: 20 g/hL
- SKU: 500 g

Experiments carried out in Cabernet Sauvignon by die Gironde Chamber of Agriculture in Bordeaux, France, shows the impact of **IOC FRESH ROSÉ** in comparison with two control yeast strains: rosé wine that is more fruity, floral and spicy.

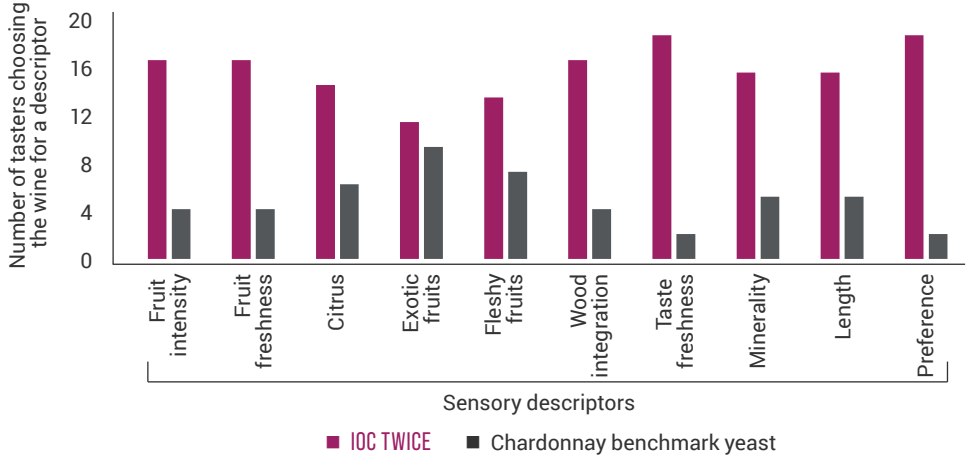


IOC TWICE

White wines with balanced mouthfeel and freshness.

- *S. cerevisiae*.
- Sensory: Citrus, lemon, peach, apricot, floral, roundness and freshness.
- Application: Chardonnay, Viognier, Grenache and Sémillon.
- Notes: Creating wines with a balance between volume and fresh finish; increased intensity of complex fruity aromas; increased fattiness and roundness; also suitable for semi-sweet wines.
- Dosage: 20 g/hL
- SKU: 500 g

Sensorial analysis (paired tasting) of a Chardonnay (South Africa) by 20 professionals on a tasting panel, comparing **IOC TWICE** with a benchmark Chardonnay strain.



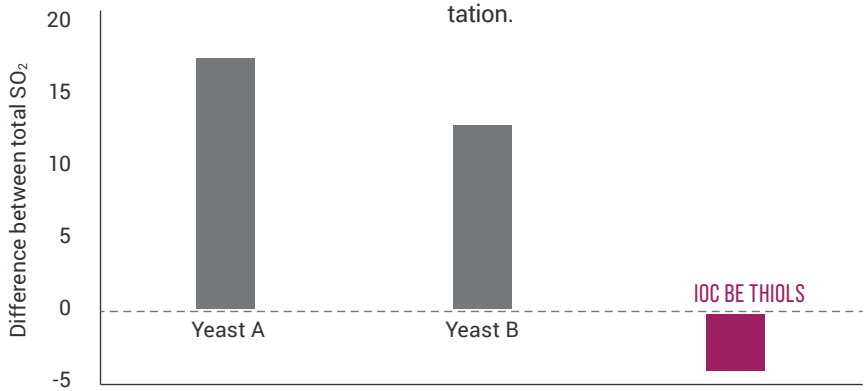
Low SO_2 solutions

IOC BE THIOLS

White and rosé wines with fruity thiols.

- *S. cerevisiae*.
- Sensory: Citrus, exotic fruits and pineapple.
- Application: All white thiol varieties, like Sauvignon blanc, Colombard, as well as Chenin blanc; rosé wines from Shiraz, Cabernet Sauvignon and Merlot.
- Notes: Reduced formation of ethanal; none to low SO_2 production.
- Dosage: 20 g/hL
- SKU: 500 g

The difference in total SO_2 (mg/L) measured in the must and the finished wine of a Sauvignon blanc (initial sulphur addition of 50 mg/L; pH 3.3; alcohol 12.25%). **IOC BE THIOLS** is a low SO_2 solution with very little to no impact on the total sulphur concentration during fermentation.



RED WINE

EXOTICS MOSAIC

Iconic, barrel-aged red wines.

- *S. cerevisiae* x *S. paradoxus* hybrid.
- Sensory: Red and black fruits, violets, cocoa aromas and flavours.
- Application: Shiraz, Merlot and Pinotage.
- Notes: Fermentations above 18 °C; high glycerol production; good mouthfeel; fructophilic; partially degrades malic acid.
- Dosage: 30 g/hL
- SKU: 250 g

EXOTICS NOVELLO

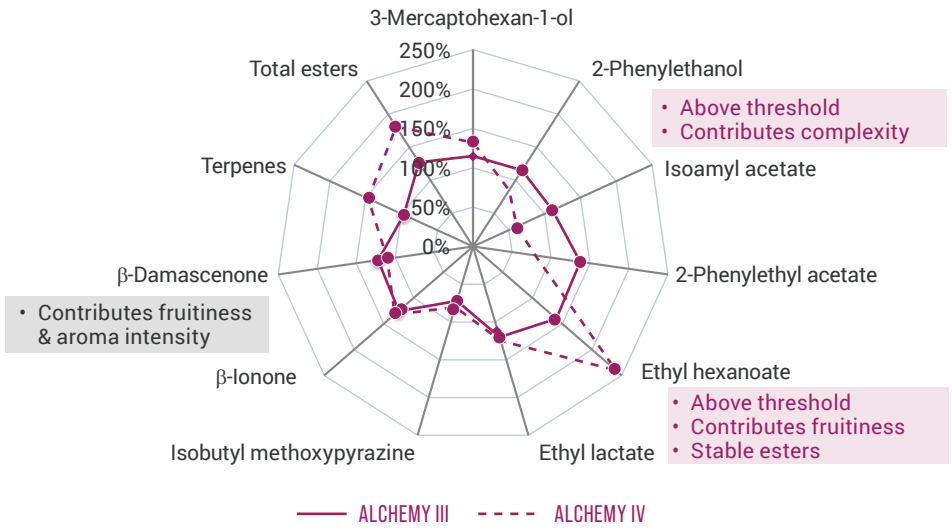
Soft, full-bodied and aromatic red wines.

- *S. cerevisiae* x *S. cariocanus* hybrid.
- Sensory: Fresh, fruity and floral red wines with a softened, but structured palate.
- Application: All red varieties.
- Note: Decreased astringency, dryness and bitterness; increased mouthfeel and quality; increased red, black fruit and spicy notes; decreased green and vegetal characters.
- Dosage: 30 g/hL
- SKU: 250 g

ALCHEMY III

Complex red wines.

- Yeast blend.
- Sensory: Complex, rose, floral, fruit and raspberry characters with good structure and body.
- Application: All red varieties.
- Notes: Stable fruit esters; masks green characters; wines with increased ageing potential.
- Dosage: 30 g/hL
- SKU: 1 kg



ALCHEMY IV

Red wines with intense red fruit aromas.

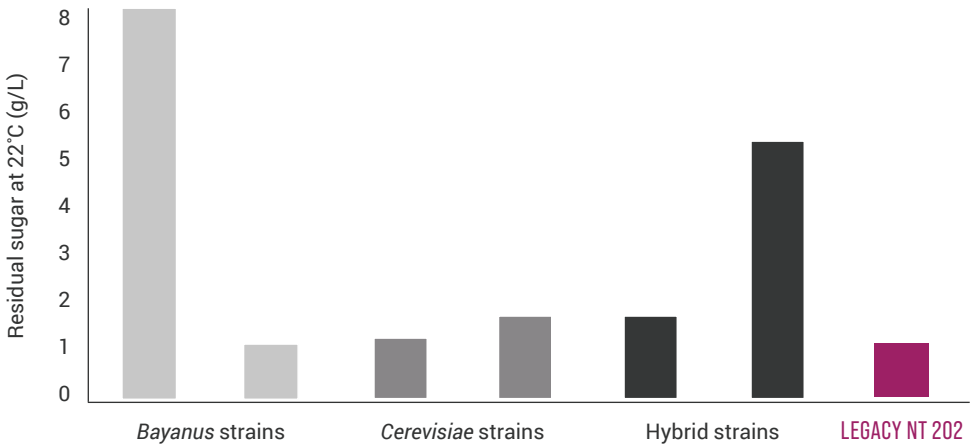
- Yeast blend.
- Sensory: Red fruit aroma intensity like cherry, raspberry, redcurrant and pomegranate, rounded and smooth wines.
- Application: All red varieties.
- Notes: Stable esters; wines to be aged; terpenes produced; masks green characters.
- Dosage: 30 g/hL
- SKU: 1 kg

LEGACY NT 202

Intense, structured and complex red wines.

- *S. cerevisiae* x *S. cerevisiae* hybrid.
- Sensory: Red and black fruits, blackberry and blackcurrant, tobacco and prune, as well as fresh plum.
- Application: Pinotage, Merlot and Cabernet Sauvignon.
- Notes: Fructophilic; stimulates MLF.
- Dosage: 30 g/hL
- SKU: 1 kg; available on pre-order: 5 & 10 kg

Fructose utilisation by **LEGACY NT 202** in a 24 °Balling must with 30 g/L more fructose than glucose (residual sugar at 22 °C).

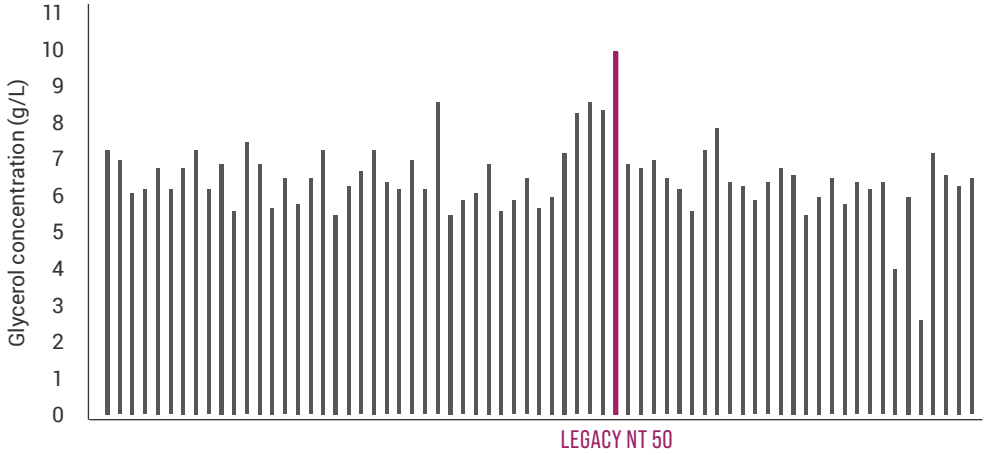


LEGACY NT 50

Fruity, rounded and easy drinking red wines.

- Incomplete *S. cerevisiae* x *S. kudriavzevii* hybrid.
- Sensory: Strawberry, cherry, blackberry, blackcurrant, some spice and chocolate.
- Application: Cabernet Sauvignon, Pinotage, Pinot noir, Merlot, Shiraz and Tempranillo.
- Notes: Suitable with or without barrel ageing; suitable for cold soaking; masks green characters; high glycerol concentration softens the mouthfeel.
- Dosage: 30 g/hL
- SKU: 1 kg; available on pre-order: 5 kg

Glycerol production of **LEGACY NT 50** in comparison with 68 other commercial wine yeast strains.



LEGACY NT 116

Full-bodied red wines for barrel maturation.

- *S. cerevisiae* x *S. cerevisiae* hybrid.
- Sensory: Blackberry and blackcurrant, Bordeaux-style wines.
- Application: Cabernet Sauvignon and Shiraz.
- Notes: Intense fruit on the palate; suitable for cold soaking; enhances varietal character.
- Dosage: 30 g/hL
- SKU: 1 kg; available on pre-order: 5 & 10 kg

LEGACY NT 112

Red wines with firm tannin structure.

- *S. cerevisiae* x *S. cerevisiae* hybrid.
- Sensory: Blackberry and blackcurrant.
- Application: Cabernet Sauvignon and Shiraz.
- Notes: Traditional style red wines to be aged; fructophilic; can produce SO_2 under stress conditions; suitable for micro-oxygenation and thermovinification.
- Dosage: 30 g/hL
- SKU: 1 kg

LEGACY WE 372

Fruity and floral red wines.

- *S. cerevisiae*.
- Sensory: Strawberry, cherry, raspberry and blackberry, fruity and floral.
- Application: All red varieties.
- Notes: Cold sensitive; softer, feminine-style wines.
- Dosage: 30 g/hL
- SKU: 1 kg; available on pre-order: 5 kg

LEGACY WE 14

Fruity Pinotage wines.

- *S. cerevisiae*.
- Sensory: Red fruit and cherry.
- Application: Pinotage.
- Notes: Must be co-inoculated with a robust red wine yeast strain.
- Dosage: 15 - 20 g/hL (in co-inoculation).
- SKU: 1 kg

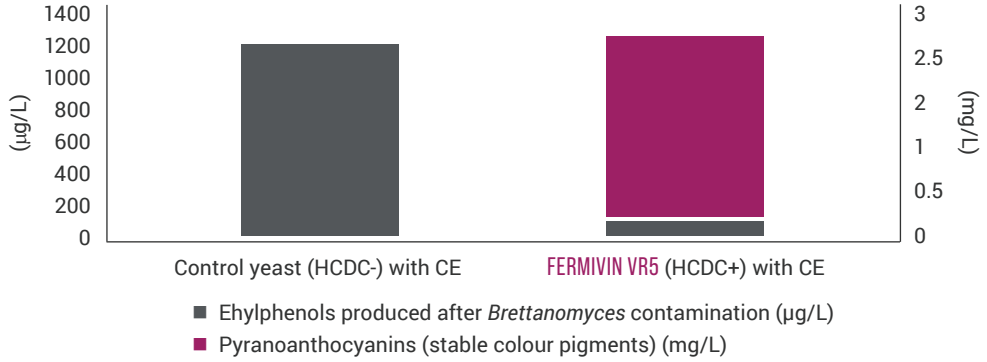
FERMIVIN VR5

Red wines to be aged.

- *S. cerevisiae*.
- Sensory: Blackcurrant, prune, cherry, spicy hints, full-bodied and plenty of structure and stable colour.
- Application: All red varieties, especially Cabernet Sauvignon and Merlot.
- Notes: Promotes optimum extraction of polyphenols and their stabilisation over time.
- Dosage: 20 g/hL
- SKU: 500 g

The colour preservation and *Brettanomyces* prevention with the use of **FERMIVIN VR5**, a HCDC+ yeast, in contaminated red wine.

The hidroxycinnamate decarboxylase (HCDC) activity of some yeast strains can promote the formation of stable colour pigments via the formation of vinylphenols thus making these compounds unavailable for *Brettanomyces* to produce off-odours.



FERMIVIN MT48

Fruity and spicy red wines.

- *S. cerevisiae*.
- Sensory: Expressive wines with soft tannins, cherry, raspberry, blackberry, plum, floral and spice; full-bodied.
- Application: All red varieties, especially Merlot and Shiraz.
- Notes: Suitable for wines matured for short periods; high concentration of glycerol produced.
- Dosage: 20 g/hL
- SKU: 500 g

FERMIVIN A33

Structured and complex red wines.

- *S. cerevisiae*.
- Sensory: Complex aromas of fruit, blackcurrant and blackberry, tobacco and chocolate hints; well-balanced.
- Application: All red varieties, especially Cabernet Sauvignon.
- Notes: Promotes polyphenol extraction and stabilises anthocyanins.
- Dosage: 20 g/hL
- SKU: 500 g

FERMIVIN XL

Fruity and smooth red wines.

- *S. cerevisiae*.
- Sensory: Red and black fruits, low astringency, roundness on the palate and balance.
- Application: All red varieties, especially Cabernet Sauvignon and Merlot.
- Notes: Adsorbs astringent tannins and softens mouthfeel.
- Dosage: 20 g/hL
- SKU: 500 g

IOC R 9008

Complex, soft red wines from mature fruit.

- *S. cerevisiae*.
- Sensory: Ripe fruits, unctuous, volume, softness.
- Application: Merlot, Cabernet Sauvignon, Cabernet franc, Malbec and Grenache.
- Notes: High polysaccharide production limits the burning sensation in high alcohol wines; promotes longevity; decreases the risk of herbaceous aromas and aggressive tannin sensations; minimises the perception of dryness and bitterness; intensifies minerality, salinity and mouthfeel persistence.
- Dosage: 20 g/hL
- SKU: 500 g

IOC RÉVÉLATION TERROIR

Fruity red wines with finesse and colour intensity.

- *S. cerevisiae*.
- Sensory: Varietal fruit aromas, strawberry, gooseberry, blackberry, freshness, finesse, elegance.
- Application: Pinot noir, Merlot, Grenache noir and Tempranillo.
- Notes: Excellent ability to preserve colour; increases colour intensity; accentuate varietal aromas; creates a good balance between freshness and maturity of the fruit; enhances the finesse and elegance of the wine.
- Dosage: 20 g/hL
- SKU: 500 g

RESTART FERMENTATION

FERMIVIN CHAMPION

Restarting stuck fermentations.

- *S. cerevisiae* subsp. *bayanus*.
- Sensory: Neutral.
- Application: All varieties.
- Notes: Respects varietal character.
- Dosage: 30 - 60 g/hL
- SKU: 500 g

PRODUCT SUMMARY | WHITE AND ROSÉ WINES

APPLICATION	YEAST	Application: white wine	Application: rosé wine	Fructo-philic	Cold tolerance (°C)	Alcohol tolerance (%)	Osmo-tolerance (°B)	Nitrogen demand
BIOPROTECTION	GAÏA	Bioprotection	Bioprotection		0	n/a	n/a	n/a
NON-*SACCHAROMYCES*	FERMIVIN VINEAE	Floral & aromatic	Floral & aromatic		**15**	**10%**	**n/a**	**Low**
WHITE & ROSÉ WINES	EXOTICS MOSAIC	Complexity & mouthfeel	Mouthfeel	■	18	15.5	25	Average
	EXOTICS NOVELLO	Complexity & freshness	Thiol style	■	15	15.5	25	Average
	ALCHEMY I	Fruity esters			12	15.5	25	Average
	ALCHEMY II	Thiols			12	15.5	25	Average
	ALCHEMY IV		Red-fruit style		16	15.5	26	Average
	LEGACY VIN 2000	Complexity & citrus		■	12	15.5	25	Low
	LEGACY VIN 13	Fruity esters	Amylic style	■	10	17	27	Low
	LEGACY VIN 7	Thiols			13	14.5	24	Complex
	LEGACY NT 116	Fresh & fruity	Fresh & fruity		11	16	26	Low
	LEGACY WE 14	Sweet wines			14	15	24	High
	LEGACY N 96	Varietal characters			11	16.5	27	Low
	FERMIVIN 4F9	Volume & mouthfeel	Thiol style		14	15.5	26	Average
	FERMIVIN XL		Red-berry style		20	26	15.5	Average
	IOC 18-2007	Varietal characters		■	8	15	25	Low
	IOC B 2000	Freshness	Exotic fruits & citrus		12	14	24	Low
	IOC BE THIOLS	Fruity thiols	Thiol style		13	15	25	Average
RESTART	FERMIVIN CHAMPION	Restart	Restart		15	18	30	Average

PRODUCT SUMMARY | RED WINES

APPLICATION	YEAST	Application	Fructo-philic	Cold tolerance (°C)	Alcohol tolerance (%)	Osmo-tolerance (°B)	Nitrogen demand	MLF compati-bility
BIOPROTECTION	GAÏA	Bioprotection		0	n/a	n/a	n/a	++
NON-*SACCHAROMYCES*	FERMIVIN VINEAE	Floral & aromatic		**15**	**10**	**n/a**	**Low**	+++
RED WINES	EXOTICS MOSAIC	Complexity & mouthfeel	■	18	15.5	25	Average	+++
	EXOTICS NOVELLO	Freshness & mouthfeel		15	15.5	25	Average	++
	ALCHEMY III	Complexity		16	15.5	26	Average	++
	ALCHEMY IV	Intense red fruit		16	15.5	26	Average	++
	LEGACY NT 202	Structure & complexity	■	18	16	26	Average	+++
	LEGACY NT 50	Fruitiness & softness		13	15.5	26.5	High	++
	LEGACY NT 116	Full-bodied & fruity		11	15.5	26	Low	++
	LEGACY NT 112	Structured & dark fruit	■	20	15.5	26	Average	+
	LEGACY WE 372	Light & fruity		16	15.5	24.5	Average	++
	LEGACY WE 14	Pinotage		14	15	25	High	++
	FERMIVIN VR5	Longevity		18	15.5	26	Low	++
	FERMIVIN MT48	Fruit & spice		20	15	25	Low	++
	FERMIVIN A33	Structured & complex		22	15.5	26	High	++
	FERMIVIN XL	Smooth & fruity		20	15.5	26	Average	++
	IOC R 9008	Fruitiness & structure		18	16	26	Low	++
	IOC RÉVÉLATION TERROIR	Fruitiness & colour intensity		18	15	25	High	++
RESTART	FERMIVIN CHAMPION	Restart	■	15	18	30	Average	n/a

CHAPTER 04

BACTERIA FOR MALOLACTIC FERMENTATION

INTRODUCTION

EFFECTS OF MALOLACTIC FERMENTATION ON WINE COMPOSITION AND QUALITY

REDUCTION IN ACIDITY

L-malic acid is catabolised to the weaker L-lactic acid during malolactic fermentation (MLF), with a corresponding loss in acidity. This decrease can vary due to the buffering capacity of the wine, as well as initial pH, but the acid will typically decrease by 1 to 3 g/L and the pH may rise by 0.1 to 0.3 units.

FLAVOUR CHANGES

The decrease or increase in certain wine aroma and flavour attributes is dependent on the bacteria strain characteristics, the intensity of the varietal aroma characteristics and the winemaking techniques employed. Besides de-acidification, flavour descriptors for wines that have undergone MLF include: buttery, lactic, nutty, yeasty and oaky, as well as impacting fruity and vegetative aromas and mouthfeel. The mechanisms by which lactic acid bacteria (LAB) can modify the wine flavour include:

- The removal of existing flavour compounds due to adsorption to the cell wall.
- The production of new flavour compounds via the metabolism of sugars, amino acids and other substrates.
- The metabolism of grape and yeast-derived secondary metabolites to lesser or more flavourful compounds.

Diacetyl. The production of diacetyl via citric acid metabolism increases the buttery, nutty aromas. Depending on the wine type and style, low amounts of diacetyl can contribute positive buttery notes and complexity, but can at high concentrations be considered spoilage. In order to increase the diacetyl content consider: selecting a strong diacetyl-producing strain, lower bacteria inoculation rate, lower pH and temperature, shorter lees contact, higher redox potential and stabilisation of the wine immediately after the completion of malic and citric acid metabolism.

Mouthfeel. The impact on mouthfeel could possibly be associated with the biosynthesis of exocellular polymers, such as polysaccharides, the production of glucans or the metabolism of existing polysaccharides via β-glucanase activity. MLF can also increase anthocyanin and tannin condensation which reduces the astringency in red wines.

Fruity and vegetative aromas. Wine LAB are able to produce certain esters, like ethyl lactate and isoamyl acetate, whilst also displaying esterase activity that could impact the aroma profile. Enhanced fruity aromas during MLF have also been associated with a decrease in vegetative aromas.

Grape-derived precursors. Wine LAB that exhibit glycosidic activity can hydrolyse glycoside precursors via enzymatic reaction and release volatile aroma compounds like nor-isoprenoids, volatile phenols, monoterpenes and aliphatics.

Acetaldehyde and other carbonyls. During MLF, the concentration of acetaldehyde and other carbonyls generally decrease.

Oak influence. Wine LAB can metabolically interact with oak compounds. As a result, wines that have undergone MLF in barrel, are described as softer, richer and fuller in flavour and less astringent, with a tendency to exhibit more colour, compared to MLF in stainless steel tanks.

Amino acids and undesirable aroma compounds. A variety of amino acids can be utilised by LAB to produce volatile sulphur compounds (methionine), N-heterocycles (ornithine and lysine) and biogenic amines.

CATALOGUE

CO-INOCULATION

ANCHOR DUET AROM

Enhanced fruit and spicy notes.

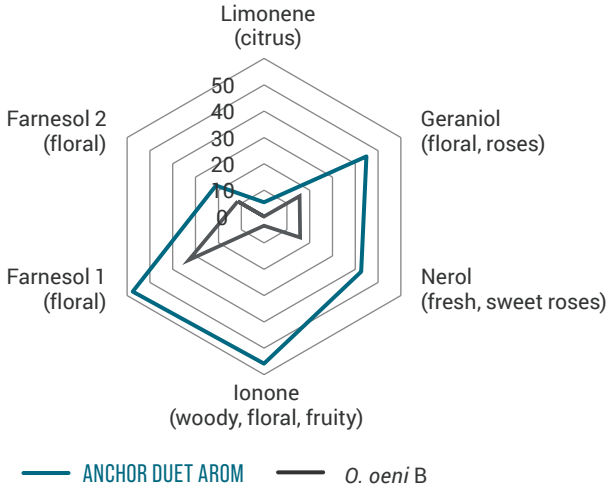
- Blend of *Oenococcus oeni* x *Lactobacillus plantarum.*
- Application: Enhanced aroma intensity; red fruit characters via ester production; enhanced spicy notes; increases terpenes and nor-isoprenoids via β-glucosidase activity that enhance fruity and floral characteristics; increased wine quality.
- Dosage: 1 g/hL
- SKU: 25 g (25 hL)

ANCHOR DUET SOFT

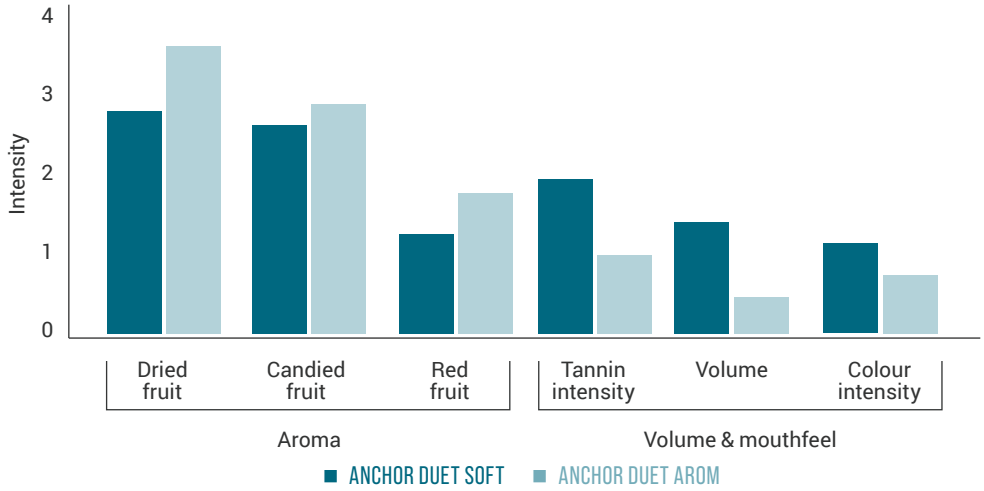
Enhanced mouthfeel and softness.

- Blend of *Oenococcus oeni* x *Lactobacillus plantarum.*
- Application: Enhanced mouthfeel; decreased green characters; reduced astringency; enhanced dark fruit aromas; increased wine quality.
- Dosage: 1 g/hL
- SKU: 25 g (25 hL)

The *L. plantarum* strain with ß-D-glucosidase activity, like in **ANCHOR DUET AROM**, can liberate bound aroma compounds like monoterpenes and nor-isoprenoids. These compounds enhance the fruity and floral profile of the wine.



The **DUET RANGE** is developed to enhance the overall wine quality and the different blends have different sensory impacts in the wine. A comparison of this bacteria range for co-inoculation (with tannin additions) and their impact on the sensory profile.

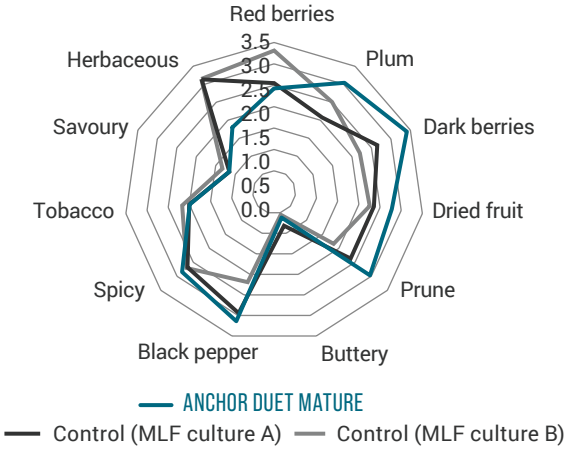


ANCHOR DUET MATURE

Enhanced dark fruit profile during fermentation and maturation.

- Blend of *Oenococcus oeni* x *Lactobacillus plantarum.*
- Application: Increased plum and dark berry aromas; hints of spice and black pepper; enhanced floral notes; increased blackberry and blackcurrant notes (DMS release during maturation).
- Dosage: 1 g/hL
- SKU: 25 g (25 hL)

ANCHOR DUET MATURE in comparison with other commercial co-inoculation cultures | South African Cabernet Sauvignon.



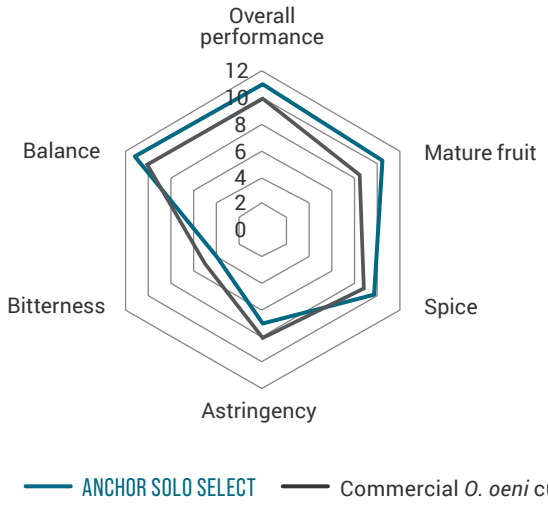
SEQUENTIAL INOCULATION

ANCHOR SOLO SELECT

Structure and balance.

- *Oenococcus oeni.*
- Application: Ensure a secure malolactic fermentation; enhance structure; increase spicy and dark fruit aroma notes; restart stuck malolactic fermentation.
- Dosage: 1 g/hL
- SKU: 25 g (25 hL)

A comparison of ANCHOR SOLO SELECT and a commercial *Oenococcus oeni* culture in Merlot (Bordeaux, France) to show the sensory impact.



IOC INOBACTER

Low pH must and wine.

- *Oenococcus oeni.*
- Application: Tolerant of very low pH conditions (>2.9); ensure MLF under challenging conditions; requires three steps: reactivation, starter culture and inoculation.
- Dosage: 0.72 g/hL (bacteria) and 4 g/L (reactivation medium).
- SKU: 25, 100 & 1 000 hL

PRODUCT SUMMARY

APPLICATION	BACTERIA	Red wine	White wine	Sparkling base wine	*Oenococcus oeni*	*Lactobacillus plantarum*	Optimum temperature (°C)	Alcohol tolerance (%)	pH tolerance	TSO_2 tolerance (mg/L)
CO-INOCULATION	ANCHOR DUET AROM	■			■	■	18 - 28	16	≥3.5	50
	ANCHOR DUET SOFT	■	■		■	■	15 - 28	15	≥3.2	50
	ANCHOR DUET MATURE	■			■	■	18 - 28	16	≥3.3	50
SEQUENTIAL INOCULATION	ANCHOR SOLO SELECT	■			■		14 - 28	16	≥3.2	50
	IOC INOBACTER		■	■	■		18 - 22	14	≥2.9	60

CHAPTER 05

ENZYMES TO IMPROVE PROCESSING & QUALITY

INTRODUCTION

Due to the challenges posed by the grape berry structure, commercial enzyme preparations focus on four main enzyme families: pectinases, glycosidases, β-glucanases and secondary activities. These enzyme formulations can be used to achieve and enhance quantitative, qualitative and processing benefits.

PECTINASES

- Consist of pectin lyase, pectin methylesterase and polygalacturonase enzyme activity.
- The polysaccharides in the cell wall and middle sheath are hydrolysed to remove the physical barrier preventing diffusion of anthocyanins, tannins and aroma precursors.
- Weakens the cell walls of the pulp and hydrolyses the soluble pectin.
- Decreases the viscosity due to pectin hydrolysis and electrostatic turbidity destabilisation then leads to sedimentation.

Impact

- Improve colour intensity and stability.
- Increase aroma precursor extraction.
- Increase free-run and press juice yields.
- Induce clarification.
- Improve filtration.

GLYCOSIDASES

- Maximise the aromatic potential by increasing the extraction process.
- Odourless aromatic precursors are present in the grape skin in a form linked to sugars.
- Sequential hydrolysis of the sugars release volatile aroma compounds like terpenols and nor-isoprenoids.

Impact

- Release bound aroma compounds.

β-GLUCANASES

Impact

- Improved filtration of *Botrytis* must.
- Enhanced yeast autolysis through a reduction in the time required, as well as increasing the quantity of released yeast compounds.

SECONDARY ACTIVITIES

- Can be beneficial or detrimental.
- Hemi-cellulases usually accompany pectinase formulations.
- Cinnamyl esterases lead to the production of vinyl phenols: beneficial in red wines when reacting with polyphenols to form stable colour compounds; detrimental in white wines and causes off-odours.
- Anthocyanases are detrimental to wine colour.

It is imperative to select an enzyme formulation based on the requirements of the winery, keeping in mind that the enzymatic activity will be influenced by: the temperature (lower temperatures slow down activity and higher temperatures denature the enzyme); the contact time and the dosage (determined by the grape variety, process, temperature and type of enzyme).

CATALOGUE

CLARIFICATION

ENZYMATIC ACTIVITIES	EFFECT ON MUST & WINE
Pectin esterase Pectin lyase Polygalacturonase Glucanase	Effects viscosity of juice, suspended particles and filterability of the wine. Improves decanting of sediments.

RAPIDASE CLEAR

Clarification of must.

- This is an enzyme for fast and efficient grape must and wine clarification. Rapidase Clear decreases the viscosity allowing for more compact lees during settling and clearer must and wine.
- Application: Pectin degradation; decrease in lees percentage; decrease in turbidity.
- Dosage: 1 - 3 g/hL or 1 - 4 mL/hL.
- SKU: 100 g; 1, 5 & 20 kg

RAPIDASE CLEAR EXTREME

Clarification under difficult conditions.

- An enzyme for fast, efficient clarification of grape must in difficult and extreme conditions. The use of this enzyme allows for more compact lees and clearer must when settling conditions are difficult, including low temperatures, pH and/or hard to settle varieties.
- Application: Pectin and side chain degradation down to 6 °C; decreases viscosity; promotes solid particle aggregation; decrease in settling time and turbidity; increase in clear juice percentage.
- Dosage: 1 - 4 g/hL
- SKU: 100 g

EXTRACTION AND MACERATION

ENZYMATIC ACTIVITIES	EFFECT ON MUST & WINE
Pectin lyase Polygalacturonase	Break down pectins from the middle lamella and primary cell wall. Promote the release of tannins and anthocyanins found in granular form inside the vacuole.
Cellulase Hemicellulase	Promote the release of tannins associated with the cell wall. Promote the extraction of aroma precursors.

RAPIDASE EXTRA PRESS

Efficient grape pressing.

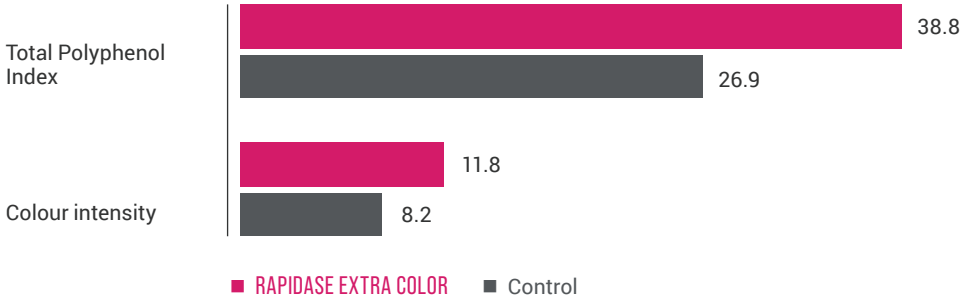
- Enzyme for fast, efficient pressing of grapes. Use of this enzyme allows for the release of juice by weakening skins and reducing pectin water retention capacity.
- Application: Pectin and insoluble protopectin degradation; increases juice yield; allows for softer and shorter pressing cycles and thus preserves grape must from oxidation; increased percentage of free-run and press juice.
- Dosage: 1.5 - 2.5 mL/100 kg
- SKU: 1, 5 & 20 kg

RAPIDASE EXTRA COLOR

Colour and polyphenol extraction in quality maceration.

- This enzyme allows for targeted extraction of colour and polyphenols contained in grape skins and reduces the requirement for more mechanical methods like punch-downs.
- Application: Grape skin cell wall degradation; increased anthocyanin extraction; enhances colour stability.
- Dosage: 2 - 4 g/100 kg
- SKU: 100 g & 1 kg

A fermentation with and without **RAPIDASE EXTRA COLOR** usage during maceration in Cabernet Sauvignon analysed at the end of malolactic fermentation. This product leads to increased levels of both the colour intensity and polyphenols.



PROCESS IMPROVEMENT

RAPIDASE FLOTATION

Enhanced efficiency during flotation.

- Enzyme for fast, efficient flotation of grape must. The use of this enzyme enables rapid viscosity decrease, allowing for faster migration of solid particles.
- Application: Soluble pectin degradation; reduces flotation time; promotes more compact foam by facilitating the accumulation of haze particles; decrease in the percentage lees and turbidity.
- Dosage: 1 - 2 mL/hL
- SKU: 5 kg

RAPIDASE FILTRATION

Facilitate and speed up filtration.

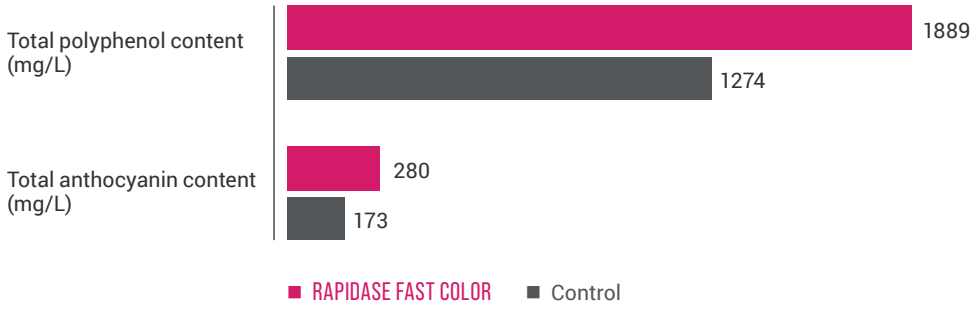
- Rapidase Filtration is a liquid enzyme formulation with a broad spectrum of hydrolases active on polysaccharides that slow and hinder the filtration of wine. It facilitates filtration by reducing wine clogging power, while safeguarding quality.
- Application: This liquid enzyme preparation displays pectolytic actions (specifically polygalacturonase and α-N-arabinofuranosidase) and β-glucanase activity.
- Dosage: 3 - 6 mL/hL
- SKU: 1 kg

RAPIDASE FAST COLOR

Colour and polyphenol extraction during short maceration.

- Highly concentrated enzyme for fast colour and polyphenol extraction in short maceration processes during red wine production. This enzyme has been specifically designed to enhance the colour extraction process within a short maceration period. The subsequent processes of draining, pressing and clarification are also facilitated.
- Application: Degradation of grape skin cell walls; increase in anthocyanin concentration.
- Dosage: 1 - 3 mL/hL
- SKU: 5 kg

Croatina grapes from Northern Italy was made with and without a **RAPIDASE FAST COLOR** treatment and analysed after one day of maceration. The treatment with this product gave the highest total polyphenol and anthocyanin content.



AROMA EXTRACTION

ENZYMATIC ACTIVITIES	EFFECT ON MUST & WINE
Pectinase Cellulase Hemicellulase	Extraction of aroma precursors.
Glycosidase	Hydrolyse odourless aroma precursors to odorous volatile substances: • Varietal aroma: key to the aromatic profile and typicity of the wine. • Enhance precursors from aromatic varieties.

RAPIDASE EXPRESSION AROMA

Aroma precursor extraction in white and rosé wines.

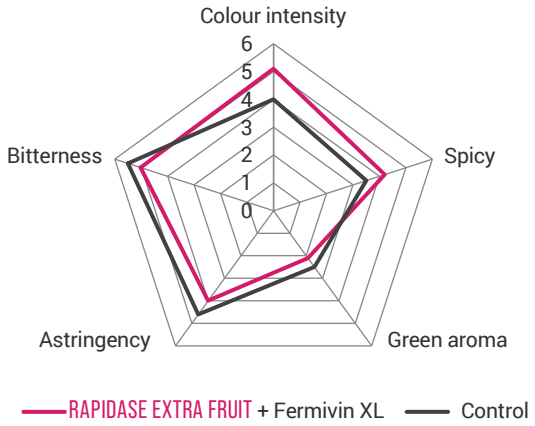
- An enzyme for fast, early and targeted aroma precursor extraction in white and rosé grape maceration. Skin contact allows for enhanced aroma intensity and complexity. Sufficient skin integrity is maintained to ensure effective downstream processing.
- Application: Skin and pulp cell wall degradation; reduces maceration time; replaces more oxidative mechanical methods; increased thiol extraction.
- Dosage: 2 - 4 g/100 kg
- SKU: 100 g

RAPIDASE EXTRA FRUIT

Aroma precursor extraction in red wines.

- This enzyme allows for the targeted extraction of aroma precursors contained in red grape skins that enhance fruity characteristics.
- Application: Skin and pulp cell wall degradation; reduces maceration time; increased roundness, raspberry and cherry characteristics; reduced astringency and herba- ceous characters.
- Dosage: 2 - 4 g/100 kg
- SKU: 100 g

RAPIDASE EXTRA FRUIT has a significant impact on the extraction of aroma precursors from grape skins and also on the colour quality. In the sensory analysis of a Pinot noir comparing the treatment of this product in combination with Fermivin XL with that of a control, the treated wines had enhanced colour intensity and showed a positive impact on the aroma and mouthfeel properties of the wine.



AGEING AND MICROBIAL CONTROL

ENZYMATIC ACTIVITIES	EFFECT ON MUST & WINE
Glycosidase	Hydrolyse odourless aroma precursors to odorous volatile substances: • Varietal aroma: key to the aromatic profile and typicity of the wine. • Enhance precursors from aromatic varieties.
ß-glucanase	Promote yeast autolysis: boost fullness and mouthfeel of the wine. Promote filterability under challenging harvest conditions.
Lysozyme	Inhibition of Gram positive bacteria (LAB): • Avoid the lactic acid spike when the alcoholic fermentation is stuck. • Inhibit MLF after the alcoholic fermentation; stabilise after MLF and before bottling.

RAPIDASE BATONNAGE

Enhancing yeast autolysis to release mannoproteins.

- Enzyme for fast, early release of colloids in wines matured on lees.
- Application: Yeast cell wall degradation; enhanced release of mannoproteins and other beneficial colloids like polysaccharides; increases the mouthfeel and balance of the wine.
- Dosage: 3 - 5 g/hL
- SKU: 100 g

DELVOZYME

Prevent lactic acid bacteria spoilage.

- Delvozyme, a purified enzyme based on lysozyme extracted from egg white, is a viable additive for achieving optimum microbial control.
- Application: Avoid bacterial spoilage during alcoholic fermentation; controlling the onset of MLF; inhibit MLF; microbiological stabilisation of wine after MLF.
- Dosage: 100 - 500 mg/L
- SKU: 1 kg

PRODUCT SUMMARY

APPLICATION	USAGE	SPECIAL FEATURES	ENZYME
CLARIFICATION	Settling	Easy to use	RAPIDASE CLEAR (L)
		Low temperature	RAPIDASE CLEAR EXTREME (G)
	Flotation	Process improvement	RAPIDASE FLOTATION (L)
MACERATION & EXTRACTION: RED WINES	Grapes with high potential	Colour stabilisation & body/structure	RAPIDASE EXTRA COLOR (G)
	Grapes with medium potential	Enhance aroma extraction	RAPIDASE EXTRA FRUIT (G)
		Speedy extraction of colour & tannins	RAPIDASE FAST COLOR (L)
	Rounded & fruity wines	Enhanced aroma & rounded flavour	RAPIDASE EXTRA FRUIT (G)
MACERATION & EXTRACTION: WHITE & ROSÉ WINES	Fruity rosé wines	Enhanced aroma	RAPIDASE EXTRA FRUIT (G)
	Juice extraction during press	Increased juice yield & promotes clarification of must	RAPIDASE EXTRA PRESS (L)
	Skin contact	White must: Concentrated extraction of aromatic precursors & increased juice yield Rosé must: Limited polyphenol extraction & increased aromatic freshness	RAPIDASE EXPRESSION AROMA (G)
POST FERMENTATION TREATMENTS	Post maceration or ageing on lees	Increased richness & aroma via accelerated autolysis of yeast	RAPIDASE BATONNAGE (G)
	Stabilisation by decanting wines	Improved efficiency of filtration process	RAPIDASE FILTRATION (L)
	Microbiological stabilisation	Control LAB & reduced SO_2 usage	DELVOZYME (G)

(G) = Granulated | (L) = Liquid

CHAPTER 06

PRODUCTS FOR FERMENTATION & CLARIFICATION

INTRODUCTION

Clarification is the process (natural or induced), whereby 'undesirable', insoluble, suspended particles are removed from the juice and/or wine and the liquid becomes 'clear'. These insoluble, suspended particles may include pectins, proteins, tannins, other phenolic compounds, pieces of grape skin, pulp and stem, as well as yeast, bacteria and tartrates. Fermentation in the presence of these solids usually leads to decreased varietal aromas, a bitter taste and a higher concentration of reductive odours. In contrast, clarified must tends to deliver fresher, fruitier aromas and a lower concentration of higher alcohols.

CLARIFICATION VIA SEDIMENTATION/ COLD SETTLING

- Reliant on gravity.
- Energy-intensive and labour intensive process.
- Require cooling and the use of commercial enzyme preparations.
- Requires little special equipment.
- There is a practical limit to the efficiency, as particles smaller than 1 µm sediment very slowly, if at all.
- Time-consuming.
- Rate of settling is dependent on the temperature, viscosity and colloidal content (particle size and density).
- Intense cleaning required (tartrate build up) and a loss of total acidity.
- Higher lees percentage and percentage of volume loss.

CLARIFICATION VIA FLOTATION

- Requires specialised apparatus: flotation unit, pressurisation pump, gas supply and dosage pump.
- Requires the use of enzymes and flotation aids.
- Flotation gasses include nitrogen (most popular), carbon dioxide, oxygen, argon and air. A pressure of 5 - 7 bars allow the bubbles to move at a speed slow enough to adhere to particles and not create unnecessary foam.
- Cost effective, fast and efficient.
- Can be done right after pressing.

- Low energy consumption/cost.
- Faster production flow (optimise tank space).
- Higher juice yield, less lees and less oxidised juice.
- No loss of tartaric acid.

Fining agents used during clarification control browning due to oxygen and improve the overall wine stability. Traditional fining agents include mineral substances (bentonite and silica), animal-derived agents (casein, egg white, gelatine and isinglass), polysaccharides (chitin, chitosan), alginates and polyphenols (tannins).

ALTERNATIVE FINING AGENTS

Due to the demand from consumers, winemakers are continually looking for alternatives to animal-derived and allergenic products in the winemaking process.

Alternatives now include pea proteins, as well as products focusing on fungal-derived chitin (*Aspergillus niger)*, as well as chitin by-products like chitosan and chitin-glucan. These products can now be used as alternatives for casein and gelatine during the fining and clarification processes, including their use as flotation adjuvants.

Chitin and chitosan are renewable polymers that have excellent properties of biodegradability, bio-compatibility, non-toxicity and adsorption. These characteristics make them ideal alternatives to animal-derived fining agents and approved for use in organic and vegan wine production.

Similarly, alternatives to casein like pea proteins and PVPP, can have an impact on phenolic compounds, colour, browning potential and the sensory attributes of the wine.

Various products exist to aid with the process of clarification, be it via sedimentation or flotation. The selection of the clarification method should be influenced by the practical parameters due to the cellar setup, as well as the desired juice quality. In addition, the selection of clarification aids can now also be influenced by consumers and their need for wines produced with products free from animal-derived origins.

CATALOGUE

CLARIFICATION VIA SETTLING

IOC COLORPROTECT V

[VEGAN WINES] [FLOTATION] [SETTLING]

Prevent and treat oxidation.

- A blend of bentonite, PVPP and vegetable proteins that has been developed to be used on must for preventing oxidation and pinking. It reduces the levels of oxidisable and oxidised phenolic compounds in must.
- Application: Protecting musts that are sensitive to oxidation; reduces brown colouring in oxidised must; significant reduction of pinking phenomena; reduces the level of protein instability.
- Dosage: 25 - 80 g/hL
- SKU: 1 kg

IOC COLORPROTECT V MES

[VEGAN WINES] [FLOTATION] [SETTLING]

Prevent and treat oxidation.

- A liquid, easy-to-use formulation of Colorprotect V. It is used for the preventative treatment of musts that are sensitive to oxidation and in particular pinking. It reduces the levels of oxidisable and oxidised phenolic compounds in must.
- Application: Can significantly enhance resistance to oxidation of oxygen-sensitive juice; reduce bitterness or herbaceous notes; allergen-free; remove brown appearance of oxidised juice; decolourising capacity and anti-pinking; reduces the level of protein instability.
- Dosage: 200 - 800 mL/hL
- SKU: 10 L

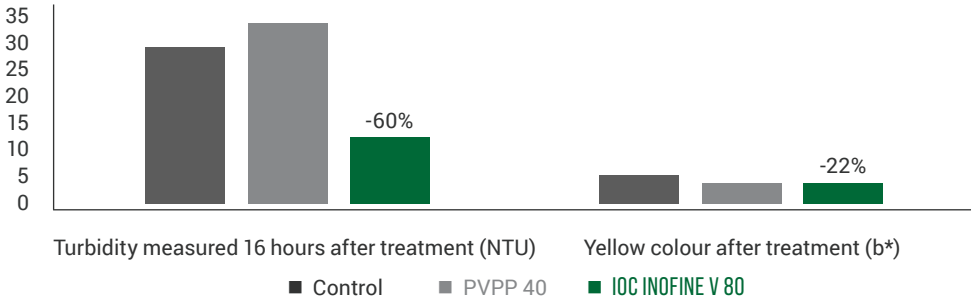
IOC INOFINE V

[VEGAN WINES] [FLOTATION] [SETTLING]

Prevent oxidation in must.

- Inofine V is a formula made up exclusively from pea proteins combined with mineral-derived additives, particularly used for applications involving must clarification due to its high reactivity with oxidisable and oxidised phenolic compounds.
- Application: Alternative to gelatine; coupled with a fining agent, it provides efficient sedimentation of suspended matter; reduce turbidity in must.
- Dosage: 10 - 30 g/hL
- SKU: 1 & 15 kg

The efficacy of the pea protein **IOC INOFINE V** (at 80 g/hL) was compared with PVPP (at 40 g/hL) and a control treatment in a Grenache rosé during settling. Whilst this product displays comparable efficiency with PVPP in reducing yellow oxidised phenolic compounds, it is more efficient in reducing the must turbidity after 16 hours of contact time.



IOC INOFINE V MES

[VEGAN WINES] [FLOTATION] [SETTLING]

Prevent oxidation in must.

- Inofine V MES is an easy-to-use liquid formulation of Inofine V with pea protein in a tartaric acid solution. Adding 300 mL/hL corresponds to an acidification of approximately 10 g/hL of tartaric acid.
- Application: Capacity to complex with polyphenols; recommended for the preventative treatment of musts liable to oxidise; recommended in settling and ensures good sediment compaction; reduce turbidity in must.
- Dosage: 100 - 800 mL/hL
- SKU: 5 L

CLARIFICATION VIA FLOTATION

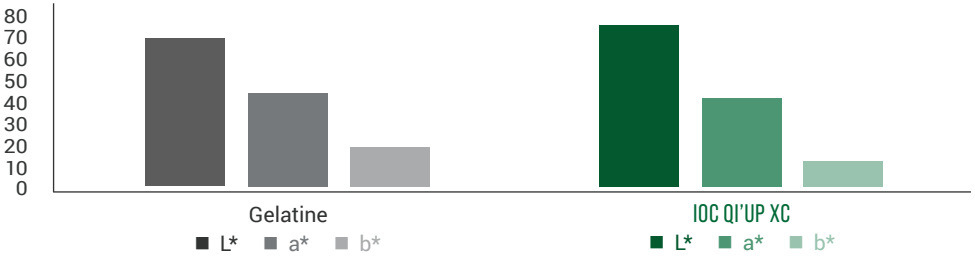
IOC QI'UP XC

[VEGAN WINES] [FLOTATION]

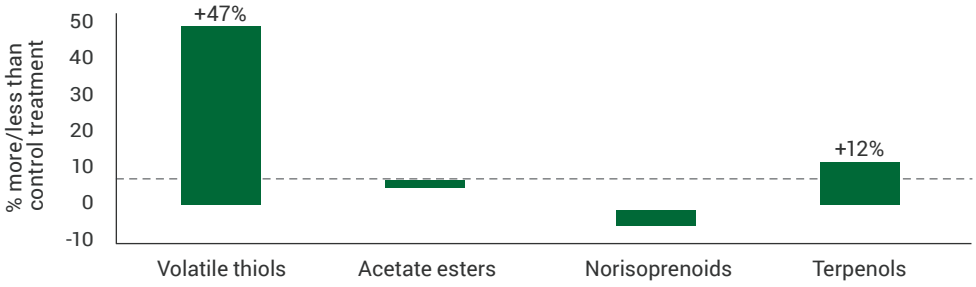
Concentrated solution for the flotation of white, rosé and red juice.

- A concentrated chitin derived flotation additive that is natural, biodegradable and non-allergenic.
- Application: Enhances the speed and performance with which the particles separate from the suspension; alternative to the use of gelatine; increase fresh fruit aromas.
- Dosage: 3 - 10 g/hL (white or rosé must) or 10 - 15 g/hL (red must from thermovinification).
- SKU: 1 kg

The evolution of the chromatic indices were measured after flotation in a Cinsaut rosé must from Languedoc, France after comparing **IOC QI'UP XC** (at 5 g/hL) with gelatine (at 10 g/hL) for their flotation efficacy. This product displays excellent efficiency in reducing the value of the yellow component (b*) by approximately 35%. It also interacts with oxidisable polyphenols preventing oxidation and the browning of the must.



IOC QI'UP XC preserves and optimises the aromatic expression of rosé wine, increasing the volatile thiols with more than 40% compared to the control treatment of pea proteins. During tasting, the wine treated with this product was scored as fresher with intense citrus notes. The control was seen as being heavier in aroma and with notes of overripe strawberries.



IOC COLORPROTECT V

[VEGAN WINES] [FLOTATION] [SETTLING]

Prevent and treat oxidation.

- A blend of bentonite, PVPP and vegetable proteins that has been developed to be used on must for preventing oxidation and pinking. It reduces the levels of oxidisable and oxidised phenolic compounds in must.
- Application: Protecting musts that are sensitive to oxidation; reduces brown colouring in oxidised must; significant reduction of pinking phenomena; reduces the level of protein instability.
- Dosage: 25 - 80 g/hL
- SKU: 1 kg

IOC COLORPROTECT V MES

[VEGAN WINES] [FLOTATION] [SETTLING]

Prevent and treat oxidation.

- A liquid, easy-to-use formulation of Colorprotect V. It is used for the preventative treatment of musts that are sensitive to oxidation and in particular pinking. It reduces the levels of oxidisable and oxidised phenolic compounds in must.
- Application: Can significantly enhance resistance to oxidation of oxygen-sensitive juice; reduce bitterness or herbaceous notes; allergen-free; remove brown appearance of oxidised juice; decolourising capacity and anti-pinking; reduces the level of protein instability.
- Dosage: 200 - 800 mL/hL
- SKU: 10 L

IOC INOFINE V

[VEGAN WINES] [FLOTATION] [SETTLING]

Prevent oxidation in must.

- Inofine V is a formula made up exclusively from pea proteins combined with mineral-derived additives, particularly used for applications involving must clarification due to its high reactivity with oxidisable and oxidised phenolic compounds.
- Application: Alternative to gelatine; coupled with a fining agent, it provides efficient flotation of suspended matter; reduce turbidity in must.
- Dosage: 10 - 30 g/hL
- SKU: 1 & 15 kg

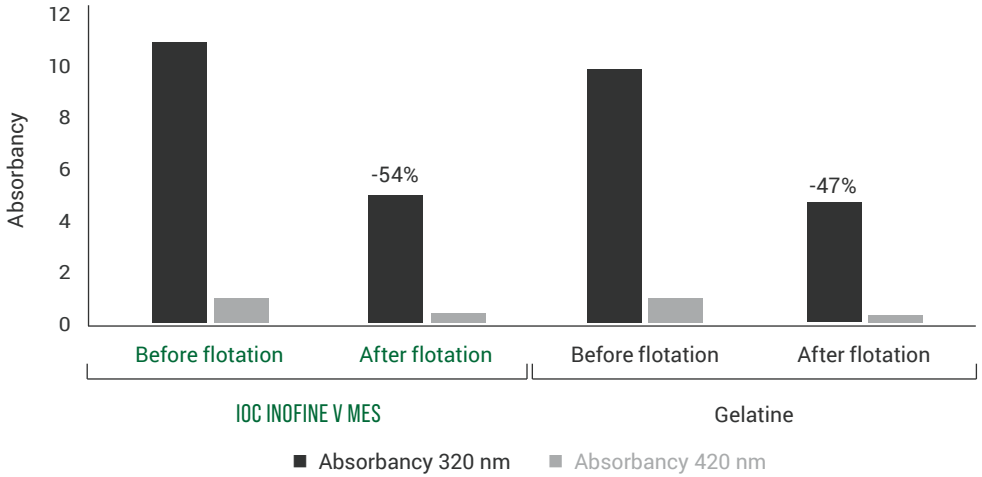
IOC INOFINE V MES

[VEGAN WINES] [FLOTATION] [SETTLING]

Prevent oxidation in must.

- Inofine V MES is an easy-to-use liquid formulation of Inofine V with pea protein in a tartaric acid solution. Adding 300 mL/hL corresponds to an acidification of approximately 10 g/hL of tartaric acid.
- Application: Capacity to complex with polyphenols; recommended for the preventative treatment of musts liable to oxidise; recommended in flotation and ensures good sediment compaction; reduce turbidity in must.
- Dosage: 50 - 100 mL/hL
- SKU: 5 L

This experiment during flotation in a South African Chenin blanc compared **IOC INOFINE V MES (at 100 mL/hL)** with gelatine (at 25 mL/hL) with regards to their impact on the phenolic compounds that affect colour. This product shows enhanced efficiency in reducing phenolic compounds responsible for brown, bitter and astringent musts. The turbidity is also significantly reduced to 38 NTU, compared to an NTU of 181 with gelatine.



IOC BENT'UP

[VEGAN WINES] [FLOTATION]

Bentonite for flotation.

- High-performance, active sodium bentonite powder for flotation. Brings about excellent cap compaction for optimal juice recovery.
- Application: Suitable for flotation; effective clarification and sediment compaction; rapid flotation times; remove protein fractions, oxidation enzymes and unstable phenolic fractions; removes thermosensitive proteins; use together with Acticarbone.
- Dosage: 30 - 80 g/hL
- SKU: 15 kg

IOC ACTICARBONE

Remove discolouration.

- This active vegetal charcoal is created for the treatment of discolouration in must.
- Application: Remove discolouration without affecting the aroma profile; can be used with flotation, combined with enzymes and fining additives; treat must as soon as possible, in combination with a pectolytic enzyme.
- Dosage: To determine dosage, contact your Technical Sales Manager (authorised legal dosage: 100 g/hL).
- SKU: 15 kg

FINING

IOC QI FINE

[VEGAN WINES] [SETTLING]

Fining must during settling to improve the mouthfeel.

- A natural, biodegradable, non-allergenic product for fining must and wine. Qi Fine is a blend of chitosan and pea protein, specifically selected for its strong reactivity to phenolic compounds.
- Application: Correct the brown colour of oxidised must; reduce bitterness and astringency; reduces harsh phenolic taste of tannins.
- Dosage: 10 - 30 g/hL (white and rosé free-run must) or 20 - 50 g/hL (white and rosé press juice).
- SKU: 1 kg

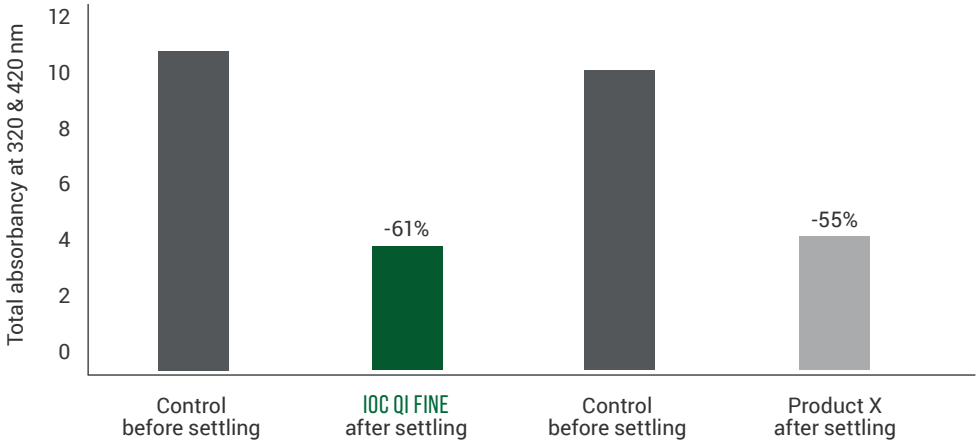
IOC QI NO[OX]

[VEGAN WINES]

Remove discoloured, oxidised compounds and improve the sensory profile.

- Consists of pea protein, chitosan and selected, ultrafiltered bentonite that assists with rapid sedimentation. It is an alternative to casein. It has been developed for its anti-oxidative properties, to be used in must.
- Application: Removes the brown discolouration, as well as caramel and Madeira notes; increases freshness; reduces vegetal notes and bitterness.
- Dosage: 30 - 80 g/hL
- SKU: 1 kg

A Pinot noir cuvée must from South Africa was treated with two fining agents during settling. The results show that **IOC QI FINE** (at 30 g/hL) is more efficient than a competitor product in reducing the phenolic compounds that cause browning of the must, bitterness and astringency. The turbidity is also reduced to 29 NTU, in comparison with the 45 NTU by Product X.



PRODUCT SUMMARY | VEGAN SOLUTIONS FOR CLARIFICATION

APPLICATION	PRODUCT	COMPOSITION	NOTES
SETTLING	IOC INOFINE V	Pea protein	Available in liquid formulation.
	IOC COLORPROTECT V	Bentonite, PVPP & pea protein	Protect oxidation sensitive must. Prevents atypical ageing of white wines. Reduces browning in oxidised wines. Significantly reduces pinking. Available in liquid formulation.
	IOC QI FINE	Chitosan & pea protein	Alternative to gelatine. Adsorbs oxidised phenolic compounds. Correct bitterness & astringency.
FLOTATION	IOC INOFINE V	Pea protein	Alternative to gelatine. Available in liquid formulation.
	IOC QI'UP XC	Chitosan	Optimise aromatic freshness. Alternative to gelatine.
	IOC BENT'UP*	Bentonite	Eliminates protein fractions & particles in suspension. To be used in combination with Qi'UP XC or Inofine V in difficult conditions.
	IOC COLORPROTECT V*	Bentonite, PVPP & pea protein	Reduced browning in oxidised wines. Available in liquid formulation. To be used in combination with a flotation agent.

*Optional

CHAPTER 07

TANNINS TO ENHANCE WINE QUALITY

INTRODUCTION

Tannins are generally added during three main stages of wine production: fermentation, ageing/cellaring and before bottling. The timing of the tannin addition, the composition of the specific product and the individual must/wine matrix will influence the impact that the tannin(s) will have in the wine.

ANTI-OXIDANT ACTION

Tannins have anti-oxidant properties and can stop oxidation reactions that occur due to the production of free radicals. Thus, acting in synergy with SO_2 and/or ascorbic acid, tannins offer more control over the redox parameters of the must during fining.

COLOUR STABILISATION

Condensed tannins can form stable complexes through their interaction with wine anthocyanins (co-pigmentation). The ellagic tannins have an anti-laccase action which prevents the browning of the wine. All these interactions contribute to stabilising the wine colour during ageing.

MOUTHFEEL AND STRUCTURE

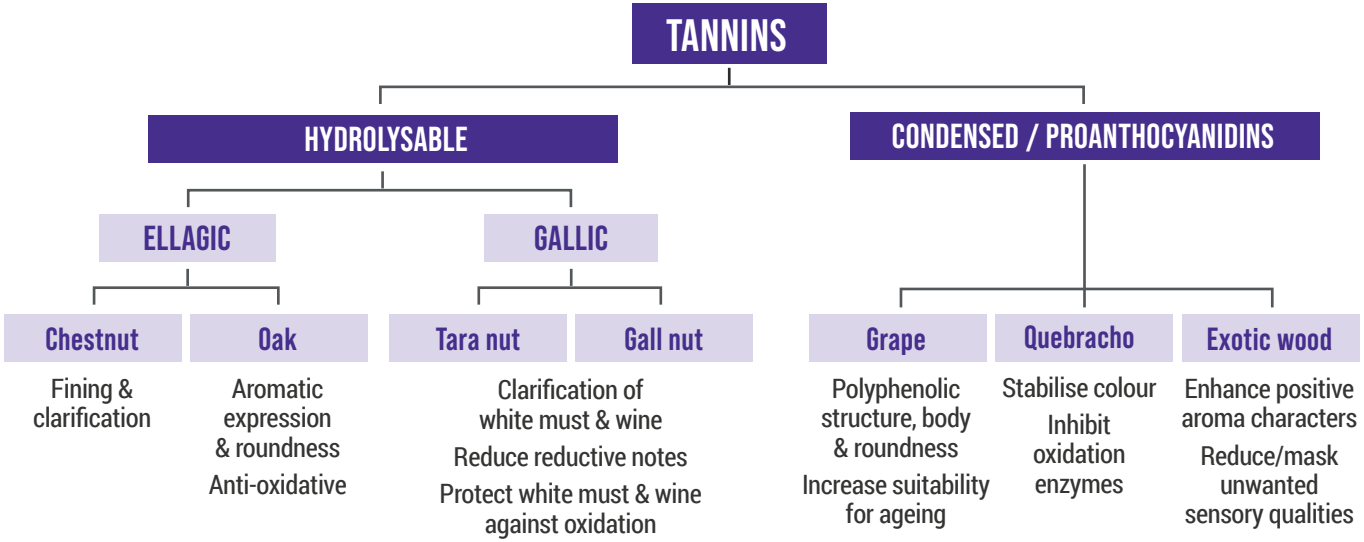
Through their interaction with the saliva proteins, wine tannins are responsible for astringency during tasting. A moderated and delicate astringency creates an impression of structure, as well as volume and mouthfeel persistence. In addition, the formation of complexes between tannins and polysaccharides convey a smooth and generous mouthfeel sensation. Tannins will thus help your wine to evolve towards more volume and roundness.

FINING

Young wines may be subject to unstable colour, green sensations and taste astringent, or even bitter. Those defaults can be lessened during the fining process, during which commercial tannins contribute as an adjuvant by combining with wine proteins. They contribute to the clarification and stabilisation of the wine and can also treat the effect of overfining.

AROMATIC IMPACT AND EFFECT ON SULPHUR COMPOUNDS

Some sulphur compounds convey unpleasant aromas. In red wines, tannins combine with those substances and reduce their negative impact. Alternatively, tannins sourced from specific wood varieties can impart specific sensory characters in the wine and therefore enhance the aroma profile.



CATALOGUE

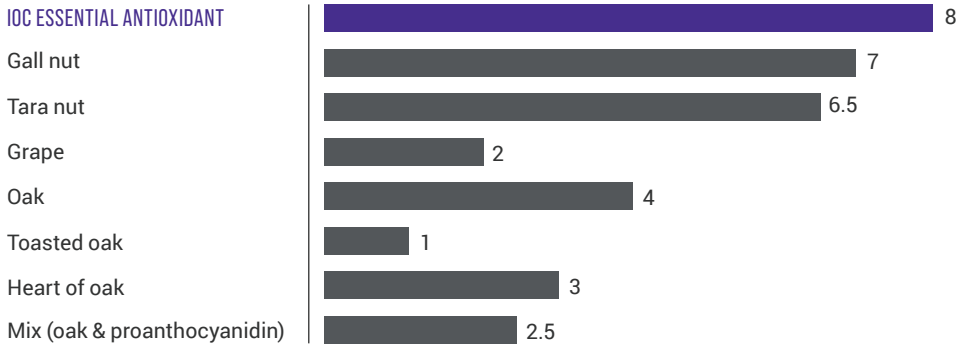
ANTI-OXIDANT

IOC ESSENTIAL ANTIOXIDANT

Protect must and wine from oxidation.

- A tannin with one of the best antioxidant potentials on the market. Limits SO_2 additions.
- Composition: Gallic tannin (gall nut).
- Application: Prevent the oxidation of must and wine without adding bitterness or astringency; ideal for the production of white and rosé wines; inhibits enzymatic activities of laccase and tyrosinase that are responsible for oxidising must from *Botrytis*-affected harvest.
- Dosage: 1 - 10 g/hL
- SKU: 1 kg

These results show the anti-oxidant capacity of polyphenols extracted from various botanical sources. **IOC ESSENTIAL ANTIOXIDANT** proves to have the highest anti-oxidant potential with an anodic charge of close to 8 µC. It is the most easily oxidisable and consequently the most reactive to oxidation in wines. Grape and toasted oak tannins have a lower anti-oxidant capacity.



IOC TANIN CRISTALLIN

Protect against oxidation in the case of *Botrytis* spoilage.

- A tannin that protects against oxidases resulting from *Botrytis cinerea* and eliminates protein hazes by precipitating excess proteins in must. Add at crusher to act as sacrificial tannin in disease-affected grapes.
- Composition: Gallic tannin (tara nut).
- Application: Enhance the antioxidant properties of sulphur dioxide; early usage on must avoids bitter sensations in finished wines; facilitates clarification; use on sparkling wines, at harvest or tirage to improve preservation; add structure and finesse to white wines.
- Dosage: 2 - 6 g/hL
- SKU: 1 kg

PROTECT AND STABILISE COLOUR

IOC TANIN BOUQUET R36

Stabilise colour, enhance freshness and red fruit aromas.

- A tannin for the fermentation of rosé, and young and medium aged red wines. This product increases the red berry fruit taste, with a strong action in stabilising the colour. It has the biggest sensory impact when added during alcoholic fermentation.
- Composition: Ellagic and condensed tannins (mimosa and cherry wood; quebracho free).
- Application: Increases the concentration of glycosylated aroma precursors; intense aromas of cherry, strawberry and blueberry that complement varietal and fermentation aromas; promotes colour stabilisation; prevents oxidation of primary aromas.
- Dosage: 2 - 15 g/hL (rosé wine) or 5 - 20 g/hL (red wine).
- SKU: 1 kg

IOC TANIN SR

Prevent oxidative spoilage and encourage colour stability.

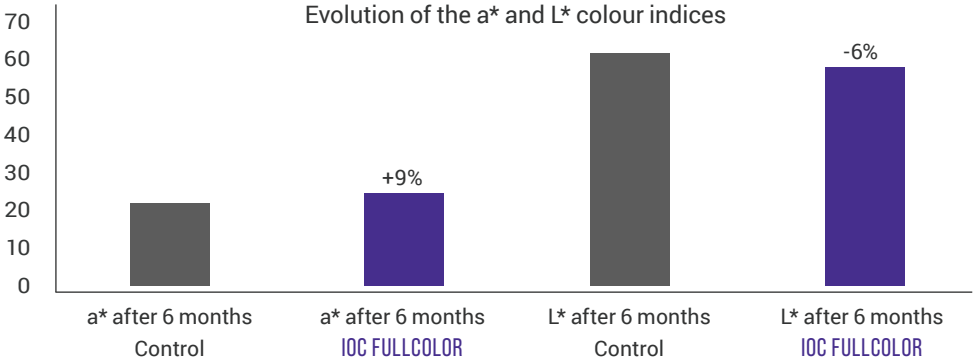
- Tanin SR is an extract of tannins with a tannic acid content greater than 70% to be used during fermentation. Efficiently reduces the activity of polyphenoloxidases.
- Composition: Proanthocyanidin tannin (quebracho).
- Application: When used during prefermentation, it prevents the oxidative spoilage of anthocyanins. Stabilise colour and improve structure during the maceration of red wines.
- Dosage: 15 - 30 g/100 kg (maceration) or 15 - 30 g/hL (vinification).
- SKU: 1, 5 & 15 kg

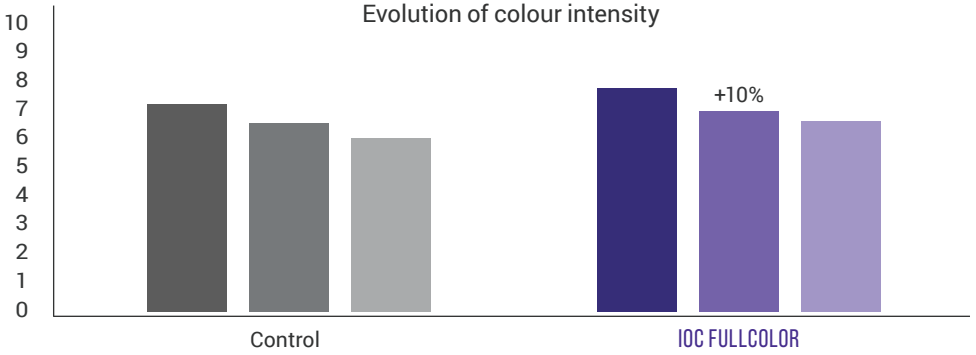
IOC FULLCOLOR

Protection and stabilisation of colour.

- An oenological tool for enhancing and protecting colour stabilisation during fermentation, whilst enhancing structure, reducing astringency and increasing mouthfeel.
- Composition: Ellagic and proanthocyanidin tannins (chestnut and mimosa; quebracho free) and polysaccharides.
- Application: Use at the fermentation stage to increase phenol compound stability and reduce tannin impact; enhance the body and structure of the wine; aid colour stabilisation and help avoid colour loss; protect the anthocyanins from oxidation and precipitation at the fining stage; inhibits laccase and tyrosinase.
- Dosage: 20 - 80 g/hL
- SKU: 1 kg

The addition of 40 g/hL **IOC FULLCOLOR** (to a wine thermotreated and fermented in liquid phase) resulted in the following: a 9% increase in the red colour intensity (a*), a 6% decrease in clarity which results in a darker wine (L*) and a 10% increase in the colour intensity.





IOC ESSENTIAL PEP

Protect colour and enhance structure

- Essential PEP provides notable anti-oxidant properties that can be added during the alcoholic fermentation, fining or pre-bottling stages. It protects the colour of wines like a pure grape tannin.
- Composition: Proanthocyanidin tannins (grape and mimosa).
- Application: Increase colour stabilisation in rosé and red wines during fermentation; increased structure in red wines; improved qualitative characteristics when added during the fining process; protection against oxidation when used before final racking and the end of barrel storage; improves the body and aromatic complexity of the wine when added during fining and pre-bottling stages.
- Dosage: 5 - 30 g/hL
- SKU: 500 g

IOC ESSENTIAL PEL

Enhance structure and suitability for ageing.

- A tannin preparation with significant anti-oxidative properties, perfect for improving the quality of wines by increasing their softness and aromatic intensity. It enhances ageing in barrels.
- Composition: Proanthocyanidin and gallic tannins (grape skin, mimosa and tara nut).
- Application: Increase anti-oxidant protection and ensure long-lasting freshness (fermentation, racking and pre-bottling); improving the structure and flavour balance (pre-bottling); improve taste perception, compensate for polyphenol deficiency; contribute roundness.
- Dosage: 1 - 20 g/hL
- SKU: 500 g

RESTORE FRESHNESS AND MASK VEGETAL NOTES

IOC ESSENTIAL PASSION

Enhance freshness and aroma profile.

- Essential Passion is elaborated from red fruit trees and can be added to rosé and red wines during ageing or up to 10 days before bottling. Early usage (free-run to ageing stage) will rapidly develop the phenolic potential and effectively build the structure of the wine.
- Composition: Proanthocyanidin tannin (cherry wood).
- Application: Enhance fruity aromas; increase the delicacy of the wine; increase the aromatic intensity; anti-oxidative properties; sweetness; increased intensity of varietal aromas and freshness.
- Dosage: 1 - 15 g/hL
- SKU: 500 g

IOC ESSENTIAL FREE VEG

Reduce the perception of herbaceous characters.

- Essential Free Veg can be used to fine white, rosé and red wines. It provides a strong anti-oxidant action and helps to mask vegetative notes in wines made from unripe grapes.
- Composition: Proanthocyanidin tannin (mimosa).
- Application: Masks vegetative aromas; masks astringent sensations; enhance varietal character.
- Dosage: 5 - 10 g/hL (white and rosé wine) or 10 - 20 g/hL (red wine).
- SKU: 500 g

ENHANCE SENSORY CHARACTERS

Ellagic tannins, extracted from oak, holds the property of influencing the redox potential of the wine. Adding them during ageing or just before bottling will help to open up the wine's bouquet and its aromatic purity by correcting organoleptic deficiencies associated with reduction (sulphur off-odours) or oxidation (notes of ethanal, odour of fresh apples). With its specific aromatic character, each formulation contributes to complexity, mouthfeel and brings a sensation of smoother, softer and more integrated tannins.

IOC ESSENTIAL OAK SWEET

Sweetness, balance and aromatic intensity.

- Essential Oak Sweet combines the effect of three tannins to enhance complexity on the palate and strengthen body to provide length.
- Composition: Ellagic tannins (oak).
- Application: Increased softness and sweetness; increased balance in barrel-aged wines; increased aroma intensity with honey and cocoa notes.
- Dosage: 1 - 15 g/hL
- SKU: 500 g

IOC ESSENTIAL OAK BARREL

Aromatic complexity and structure.

- Essential Oak Barrel combines the effect two tannins to enhance aromatic complexity on the palate.
- Composition: Ellagic tannins (oak).
- Application: Improved sweetness and aromatic intensity; improve the fullness of the wine; strengthen the structure and balance; optimises the colour depth in red wines.
- Dosage: 1 - 10 g/hL
- SKU: 500 g

IOC ESSENTIAL OAK STRONG

Structure and aromatic complexity.

- Essential Oak Strong combines the effects of three tannins. It reinforces the structure of the wine and adds to the aromatic complexity.
- Composition: Ellagic tannins (oak).
- Application: Structure; optimise general balance; intensifies the length; reveals complexity; liquorice and tobacco notes.
- Dosage: 1 - 10 g/hL
- SKU: 250 g

IOC PRIVILÈGE BLEU

Smoothness, body and aromatic intensity.

- Privilège Bleu adds American oak characters, adding a sensation of smoothness and full-bodiedness.
- Composition: Ellagic tannin (American oak).
- Application: Anti-oxidant; contributes to the structure and body; strengthen aromatic intensity; coconut, chocolate and coffee notes.
- Dosage: 1 - 15 g/hL
- SKU: 250 g

IOC PRIVILÈGE NOIR

Structure, fullness and aromatic balance.

- Privilège Noir combines the impact of two tannins, adding structure and body.
- Composition: Ellagic and proanthocyanidin tannins (French oak and cherry tree).
- Application: Anti-oxidant; contributes to the structure; emphasises red and ripe fruit aromas; increase balance; fullness; aromatic finesse.
- Dosage: 1 - 10 g/hL
- SKU: 250 g

PRODUCT SUMMARY

APPLICATION	TANNINS	WHEN TO ADD:				IMPACT:						APPLICATION:			
		Pre-fermentation	Fermentation	Ageing	Pre-bottling	Aroma	Colour	Anti-oxidant	Structure	Freshness	Complexity	White wine	Rosé wine	Red wine	Sparkling wine
ANTI-OXIDANT	IOC ESSENTIAL ANTIOXIDANT	■	■	■		■		■		■	■	■	■	■	■
	IOC TANIN CRISTALLIN	■	■	■		■		■		■	■	■	■	■	■
PROTECT & STABILISE COLOUR	IOC TANIN BOUQUET R36		■			■	■	■	■	■	■		■	■	
	IOC TANIN SR		■				■	■						■	
	IOC FULLCOLOR		■			■	■	■	■	■	■		■	■	
	IOC ESSENTIAL PEP		■	■	■		■	■	■		■	■	■	■	■
	IOC ESSENTIAL PEL			■	■	■	■	■		■	■	■	■	■	■
RESTORE FRESHNESS & MASK VEGETAL NOTES	IOC ESSENTIAL PASSION				■	■	■	■		■	■	■	■	■	■
	IOC ESSENTIAL FREE VEG				■	■				■		■	■	■	■
ENHANCE SENSORY CHARACTERISTICS	IOC ESSENTIAL OAK SWEET				■	■			■		■	■	■	■	■
	IOC ESSENTIAL OAK BARREL				■	■			■		■	■	■	■	
	IOC ESSENTIAL OAK STRONG				■	■			■		■	■	■	■	
	IOC PRIVILÈGE BLEU				■	■			■		■	■	■	■	■
	IOC PRIVILÈGE NOIR				■	■			■		■	■	■	■	■

CHAPTER 08

PRODUCTS TO FINE WINE

INTRODUCTION

Fining can be described as the addition of a reactive or an adsorptive substance to must or wine, in order to remove (or reduce the concentration of) one or more undesirable constituents.

Fining is a widely used practice that involves adding a substance or mixture in order to clarify, stabilise or modify the organoleptic characteristics of the must or wine. Usually the fining agents bind to the target compound(s) to form insoluble aggregates that are subsequently removed. Fining agents may be composed of animal, mineral and vegetable/plant particles or macromolecules. It can also include the likes of yeast hulls, inactivated yeast, yeast protein extracts and activated charcoal, as well as animal-derived products, like casein and gelatine. In general, fining agents based on yeast derivatives have resulted in wine improvements including decreased turbidity, reduction in astringency and potential stabilisation.

The use of fining agents in wine can assist with:

- Clarification.
- Improvement of filterability.
- Preventing haze and sediment formation.
- Improve organoleptic profile and wine colour.
- Removal of undesirable elements.

Fining is not just carried out in wines for previously mentioned purposes but can also allow for cost optimisation when preparing wines for bottling. Over and above improving clarity, as well as physicochemical and microbiological stability, fining has many applications, including refining to achieve a given product target:

- Marketing a wine that is stable at a colloidal level.
- Fulfilling customer tastes by offering a wine with no excessive bitterness or astringency. In general, fining enhances taste and sensory characteristics.

Choosing the fining agent should be carried out on a case-by-case basis, as a single fining agent cannot be suitable across all applications and wines, since each matrix reacts differently. Fining agents free from allergen and animal proteins, suitable for vegetarian and vegan wines, as alternatives to egg albumin, casein, isinglass and gelatine, are also available.

It is imperative that carefully controlled laboratory fining trials must be performed before any fining agent is added to wines in the cellar. It is very important that preparation methods, temperature, mixing and timing of addition are kept the same between laboratory fining trials and the winery application, in order to ensure/achieve consistent results.

Contact your Technical Sales Manager for access to our brand new fining kit.

CATALOGUE

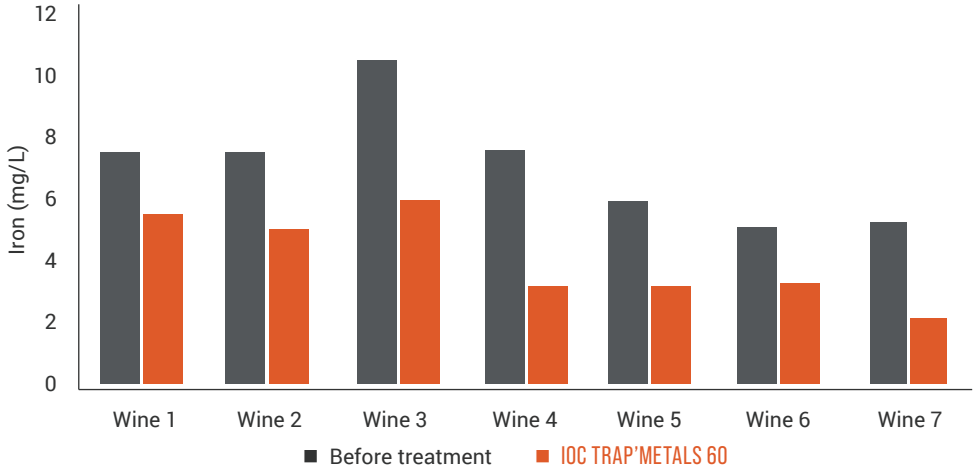
REMOVE HEAVY METALS

IOC TRAP'METALS

Reduce metals in must and wine.

- A complex preparation combining PVI, PVP, yeast hulls and chitosan that limit oxidation by removing catalysts.
- Application: Binds heavy metals like copper, iron and lead which are catalysts of oxidation; it limits the risk of ferric haze; can be used on must during the settling process to reduce levels of copper which disrupts alcoholic fermentation and impairs thiol production; efficient in reducing the sensitivity of white wines to pinking.
- Dosage: 20 - 80 g/hL (trials are recommended to determine the optimum dosage; contact your Technical Sales Manager).
- SKU: Limited samples available for harvest 2023.

IOC TRAP'METALS (60 mg/L) was used as a curative treatment in Grenache rosé wines from the Languedoc region in France. This product was able to reduce the iron concentration in the wines by between 25 and 50%. After treatment, the wines are highly clarified with an attractive pale pink colour. The wines are fruitier and the metallic finish on the palate has disappeared.



ORGANOLEPTIC CORRECTORS

Correcting colour and/or taste

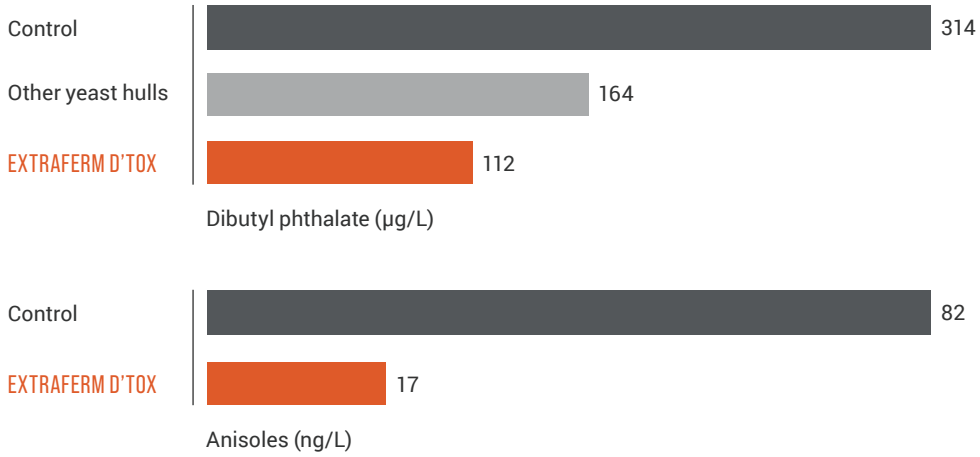
EXTRAFERM D'TOX

PREVIOUSLY "EXTRAFERM"

Detoxification and quality improvement.

- Consists of pure yeast hulls to improve wine quality by adsorbing toxic compounds and off-flavours from wine.
- Application: Removal of toxic compounds like Ochratoxin A (OTA); removal of anisoles (TCA, TBA and PCA) and dibuthyl phtalates; reduce the concentration of compounds subject to legal limits.
- Dosage: 20 - 40 g/hL
- SKU: 1 kg

EXTRAFERM D'TOX has the ability to remove unwanted and potentially hazardous molecules from finished wines. In these trials a treatment with this product (at 2 x 20 g/hL) was able to reduce the dibutyl phthalate concentration (legal limits apply) by more than 60% and the anisole concentration (mouldy aroma associated with cork taint) to below its odour threshold value.

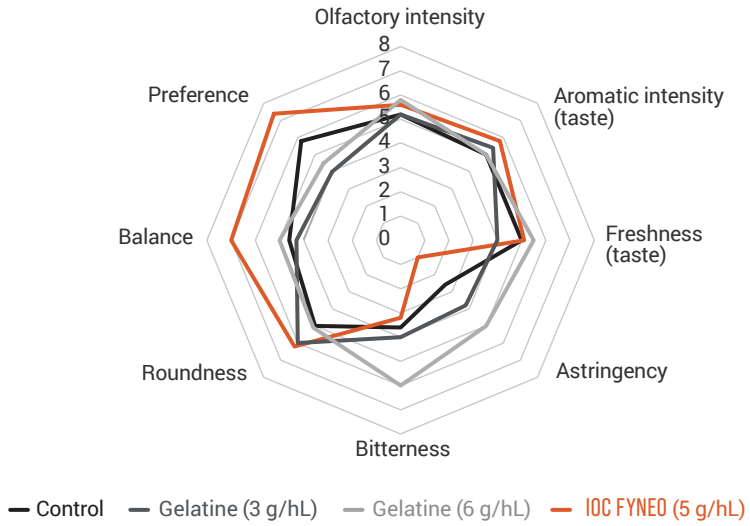


IOC FYNEO

Reduce bitterness and astringency.

- An innovative, granulated yeast protein extract for fining white, rosé and red wines. Can be used as an alternative to isinglass, gelatine and albumin.
- Application: Refine wines by eliminating harsh and bitter back palate notes; reduce astringency and bitterness; preserve aromatic profile.
- Dosage: 1 - 15 g/hL
- SKU: 1 kg

The sensory impact of **IOC FYNEO** was evaluated in a red wine from the Côtes de Rhône region in France by means of a sensory panel. In comparison with a control (no fining treatment) and gelatine treatments, the wine fined with this product showed the best balance and roundness, as well as being the most preferred wine.



IOC COLORPROTECT V

[VEGAN WINES]

Treat oxidation defects.

- A blend of bentonite, PVPP and vegetable proteins (pea) that has been developed to be used on wine for treating oxidation and pinking.
- Application: Prevents atypical ageing in white wines; reduces brown colouring in oxidised wines; significant reduction of pinking phenomena.
- Dosage: 20 - 50 g/hL (white and rosé wine).
- SKU: 1 kg

IOC COLORPROTECT V MES

[VEGAN WINES]

Treat oxidation defects.

- A liquid, easy-to-use formulation of Colorprotect V. It is used for treating oxidised wines and in particular pinking.
- Application: Can significantly enhance resistance to oxidation of oxygen-sensitive wines and fine-tune organoleptic qualities; reduce bitterness or herbaceous notes; allergen-free; remove yellow appearance of oxidised wines; decolourising capacity and anti-pinking.
- Dosage: 200 - 500 mL/hL
- SKU: 10 L

IOC QI FINE

[VEGAN WINES]

Improve colloidal stability.

- A natural, biodegradable, non-allergenic product for fining wine. Qi Fine is a blend of chitosan and pea protein, specifically selected for its strong reactivity to phenolic compounds.
- Application: Correct colour and reduce bitterness and astringency; improve filterability and colloidal stability.
- Dosage: 10 - 30 g/hL
- SKU: 1 kg

IOC ACTICARBONE

Remove discoloured compounds.

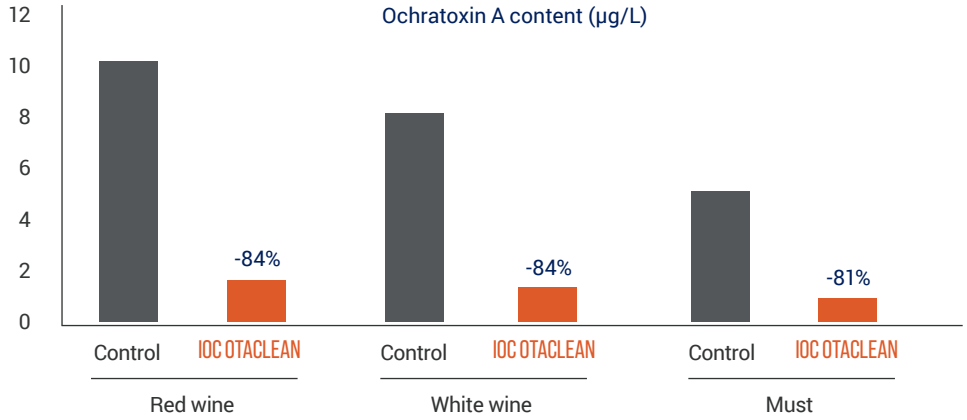
- This active vegetal charcoal is a product created for the treatment of discolouration in white wines.
- Application: Correct the colour of white wines while respecting the sensory characteristics; eliminate phenolic compounds responsible for oxidation defects and correct yellow/orange colour defects.
- Dosage: To determine dosage, contact your Technical Sales Manager (authorised legal dosage: 100 g/hL).
- SKU: 15 kg

IOC OTACLEAN

Remove unwanted spoilage compounds.

- Otaclean is a granular vegetal charcoal adapted to deodorise must and wine and is particularly active in eliminating OTA.
- Application: Adsorb wine defects including mould and vegetative aromas; remove OTA; low capacity for discolouration and avoids removing qualitative compounds.
- Dosage: 5 - 20 g/hL (organoleptic defects) or 20 - 40 g/hL (remove OTA).
- SKU: 1 kg

A treatment of 20 g/hL **IOC OTACLEAN** is sufficient to reduce the Ochratoxin A content in both juice and wine by more than 80%. There is a limit to the amount of Ochratoxin A allowed in wines.



Treat reduction

IOC NETAROM

Remove reductive aromas.

- Derived from inactivated yeast selected for their capacity to adsorb compounds responsible for reductive notes caused by sulphur compounds.
- Application: Short-term contact; adsorption of various sulphur compounds (hydrogen sulphide, methanethiol, etc.); improves volume, complexity and roundness while preserving sensory characteristics, unlike treatments like copper.
- Dosage: 20 - 40 g/hL
- SKU: 1 kg

Treat oxidation

IOC QI NO[OX]

[VEGAN WINES]

Treat oxidised wines and improve the sensory profile.

- Consists of pea protein, chitosan and bentonite that assists with rapid sedimentation. It is an alternative to casein. It has been developed for its anti-oxidative properties, to be used in wine.
- Application: Efficient removal of oxidised compounds while preserving the intrinsic qualities; restore freshness and fruitiness, as well as reviving the colour of oxidised wines; lessen organoleptic defects by eliminating bitter notes and oxidative aromas, while preserving aroma and taste properties.
- Dosage: 20 - 60 g/hL (white and rosé wine).
- SKU: 1 kg

CHAPTER 09

PRODUCTS TO STABILISE WINE

INTRODUCTION

COLLOIDAL STABILISATION

HOW ARABIC GUMS WORK IN WINE

Arabic gum essentially acts as a protective colloid that counters precipitation of suspended particles. It fosters dispersion and suspension of colloidal substances by creating a lattice around them which prevents them from agglomerating.

Unstable colloids are initially positively charged:

- Due to their natural instability, they lose their charge and start to agglomerate. As this agglomerate increases in size, they form a colloidal cloudiness that can either form a haze or precipitate.
- In contrast, arabic gum can offer colloidal protection by stabilising the negative charge. As such, these colloids repel one another and cannot agglomerate and thus the wine remains clear.

THE IMPACT OF ARABIC GUMS IN WINE

There are two main families of arabic gums: those that stabilise and ones that impact the sensory profile, each possessing unique properties.

Stabilising

Protect against:

- Precipitations of colouring material.
- Metal precipitations (ferric and cupric).
- Tartrate precipitations, thus preserving metatartaric acid.

Maintaining molecules liable to flocculate in suspension (including after disgorging for sparkling wines).

Sensory impact

- Reduce astringency.
- Heighten body, roundness and palate weight.
- Enhance the sensory profile of the wine.

When the wine is ready for bottling, arabic gum, a natural product from Acacia tree, is used as a stabilising product against colloidal instability. It also improves the aroma and taste profile of the wine.

As a protective colloid, arabic gum counters precipitation of particles in suspension and must be used on wines prior to bottling i.e. wines on which fining has been carried out, wines that are stabilised and clear. Arabic gum is added the day before final filtration prior to bottling or after the filtration stage.

CATALOGUE

STABILISING/PROTECTIVE ARABIC GUMS

IOC INOGUM MF

Stabilise phenol compounds.

- An arabic gum liquid solution, selected and purified, from Verek acacia, compatible with microfiltration. It is formulated from high quality arabic gum, selected for its stabilising and organoleptic properties.
- Application: Acts as a protective colloid with regards to various forms of physical or chemical instability: precipitations of colouring substances, unstable colloid particles and metallic precipitations (iron and copper); prevents unstable particles from linking and thus forming larger colloids liable to provoke problems of instability; particularly well-suited for treating white, rosé, red and fortified wines to avoid flocculation and precipitation of colouring material after bottling; little blocking effect and is compatible with all stages of filtration.
- Dosage: 150 - 400 mL/hL (avoid precipitation of colour material) or 200 - 500 mL/hL (sensory impact).
- SKU: 1 & 10 L

QUALITY-IMPROVING ARABIC GUMS

IOC FLASHGUM R MF

Improve mouthfeel, volume and fullness.

- A micro-filtered arabic gum in liquid solution, from Seyal acacia. It is a solution of 20% arabic gum, filtered, sulfured at 0.5% and selected for its stabilising and organoleptic properties
- Application: Harmonise the structure of thinner wines and increase the impression of volume and fullness in the mouth; in young red wines marked by excessive astringency, it masks the excessive tannin sensation and increases the balance; provides wines with protection against various forms of chemical and physical instability; it is used as protective colloid to stabilise phenol compounds; a solution with a high level of clarity and stability and therefore recommended for treating wines whenever it is necessary to avoid clogging, flocculation or precipitation after bottling.
- Dosage: 20 - 50 mL/hL (white and rosé wines) or 40 - 80 mL/hL (red wines) or 50 - 90 mL/hL (fortified wines).
- SKU: 1 & 10 L

BENTONITES

IOC BENT'UP

[VEGAN WINE]

Bentonite for protein stabilisation.

- High-performance, active sodium bentonite granules for stabilisation.
- Application: Clarification and improved stability; protein elimination in white wines prevent potential cloudiness; removal of reactive polyphenolic fractions reduce the precipitation of colour in the bottle; reduce percentage loss.
- When sending your wine samples to Vinlab to determine protein stability, you can request the analysis to be performed with IOC Bent'Up. This ensures true, reliable and accurate results when determining the correct product dosage.
- Dosage: 30 - 80 g/hL
- SKU: 15 kg

CHAPTER 10

MANNOPROTEINS TO IMPROVE WINE QUALITY

INTRODUCTION

Mannoproteins are a naturally occurring group of proteins found in the cell walls of yeast, including that of *Saccharomyces cerevisiae*. The *S. cerevisiae* cell wall mainly consists of polysaccharides (glucans and mannans), but also contains proteins, particularly mannoproteins. Mannoproteins are large molecules, with molecular weights as high as 800 000 Daltons. They can have very diverse structures, which results in a diversity of properties.

Mannoproteins consist of a polypeptide (protein) backbone chain, with highly branched mannose (naturally occurring sugar similar to glucose in structure) side chains that are linked by glycosidic bonds. Mannoproteins usually consist of approximately 20% protein and 80% mannose.

Mannoproteins are released during fermentation and then later during autolysis. Different fractions of mannoproteins are released depending on the timing: mannoproteins of exocellular origin are released during fermentation, whilst cellular ones are released upon autolysis (end of alcoholic fermentation). The amounts that are released depend on: the yeast strain, degree of must clarification and post-fermentation storage conditions.

It is possible to increase the mannoprotein content in wine via: ageing on lees, the use of enzymes, use of yeast hulls and the addition of commercial mannoprotein preparations.

Mannoproteins can influence:

- Protein and tartrate stability.
- Mouthfeel (volume, bitterness and herbaceousness).
- Sweetness and roundness.
- Polyphenols.
- Complexity.
- Aromatic persistence.
- Colour.
- Foam stability.

The production process of commercial mannoproteins involves various steps of heat and/or acid treatments and filtrations and ultra-filtrations. It is possible to obtain different fractions of mannoproteins by using different yeast strains as source material, different types of extraction methods and different conditions of ultra-filtration.

The protective colloid role played by mannoproteins is influenced by the mannose chain: it prevents the aggregation and precipitation of potassium bitartrate crystals and reacts with polyphenols avoiding oxidation. The impact of mannoproteins on the sensory properties of the wine is influenced by the peptide backbone: the higher the protein fraction, the more interactive the mannoprotein is with aroma compounds.

Commercial mannoproteins can be used to supplement the naturally occurring mannoprotein fractions present in wine and enhance their positive effect.

CATALOGUE

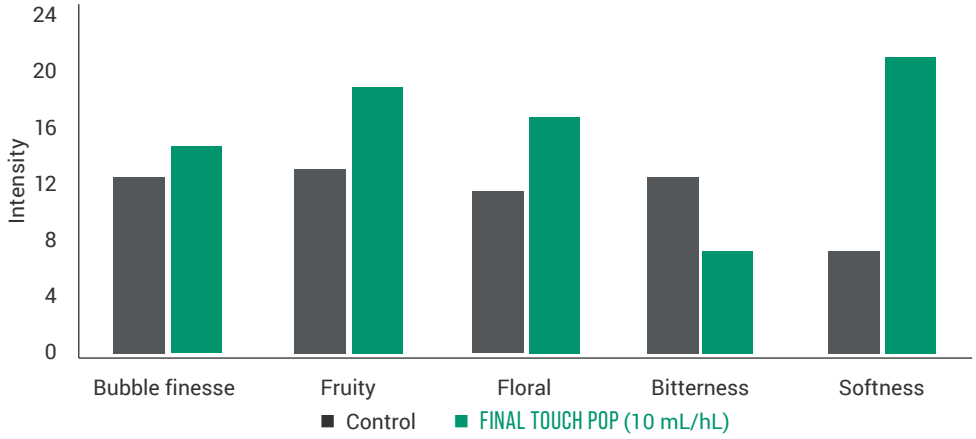
PRE-BOTTLING AND FINISHING

FINAL TOUCH POP

Improve the quality of sparkling wines.

- This is a unique mannoprotein-based solution that enhances the organoleptic qualities of sparkling wines, while also preserving their elegance, freshness and balance. The fermentation aromas and minerality of wines treated with Final touch Pop remain predominant during ageing and storage. The development of oxidative aromas (hints of ripe fruit, nuts and honey) is reduced and tannins are less astringent.
- Application: Improve the wine's structure and bubble quality; provide a refined aromatic profile and persistence; aids in elegance, freshness and balance; provide smooth and round mouthfeel; limit oxidation to increase longevity; reduce astringency of rosé and tannic sparkling wines; can also refresh base wines.
- Dosage: 20 - 40 mL/hL
- SKU: 1 L

The improved quality of Pinot noir/Chardonnay Spumante, tasted 9 months after treatment and bottling.

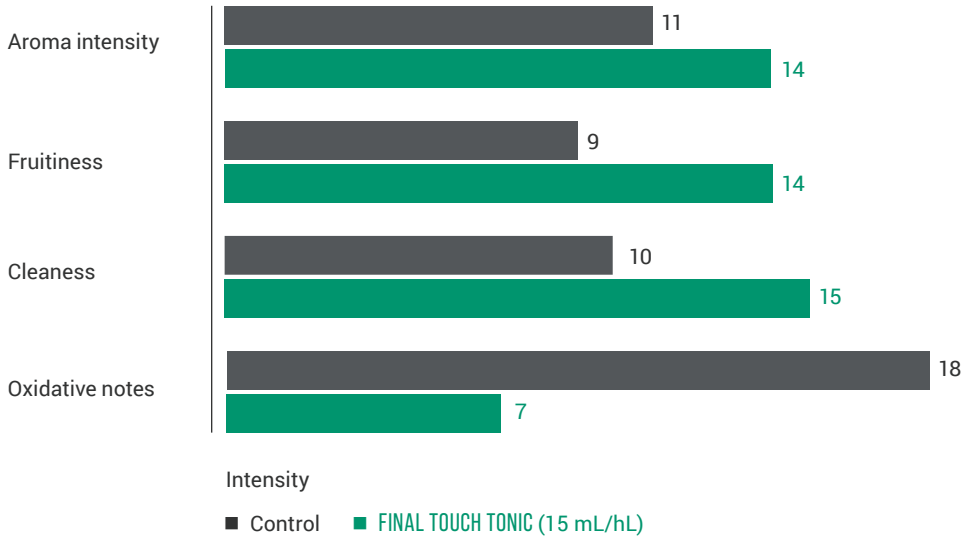


FINAL TOUCH TONIC

Enhance quality and prevent premature ageing of white and rosé wines.

- Mannoproteins selected for their powerful reducing and protective colloid properties. Final touch Tonic preserves the initial aromatic freshness of white and rosé wines as they age.
- Application: Improve and preserve the freshness; protect from oxidation over time; promote aromatic expression and persistence; contribute to the wine's colloidal balance helping to improve its structure; add to the continuity of the wine, a lower perception of acidity and more balance overall.
- Dosage: 20 - 40 mL/hL
- SKU: 1 L

The improved quality of a white wine (Viognier, Vermentino, Marsanne and Rousanne) from the southern Rhone Valley, France, tasted 10 months after treatment and bottling.

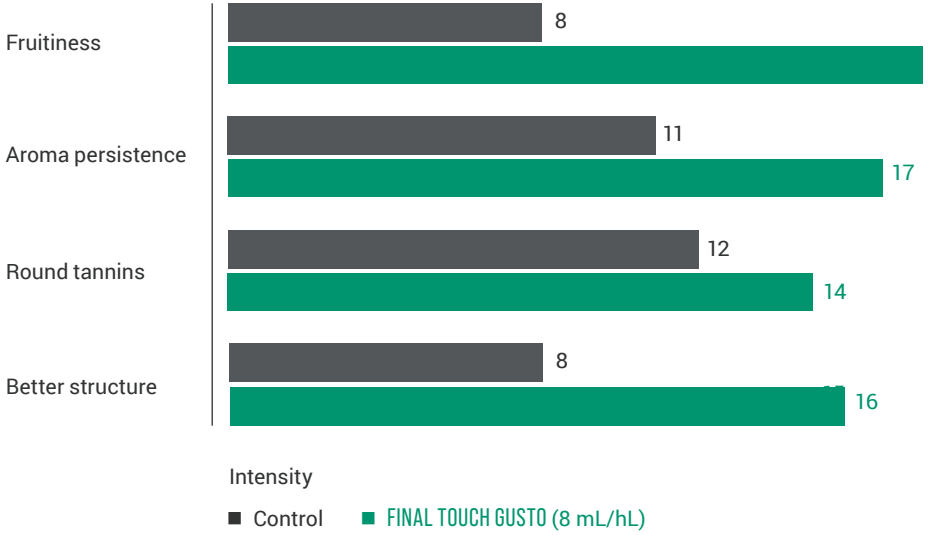


FINAL TOUCH GUSTO

Enhancing the organoleptic and sensory properties of red wines.

- When used in red wines, this mannoprotein noticeably enhances the aroma intensity, fineness and freshness, as well as reducing the astringency of tannins.
- Application: Improve the aromatic intensity; promote freshness and fruitiness; reduce astringency, more significantly at lower dosages; contribute to a rounder wine structure.
- Dosage: 10 - 40 mL/hL
- SKU: 1 L

The improved quality of a red wine (Grenache and Shiraz) from the Languedoc, France, tasted 8 months after treatment and bottling.



CHAPTER 11

SULPHUR PRODUCTS TO PROTECT WINE

INTRODUCTION

Wine quality can be preserved with sulphur dioxide (SO_2). Sulphur dioxide is used in wine for its anti-oxidant and anti-microbial properties. The effectiveness of SO_2 as an antimicrobial agent is dependent upon the pH, as well as the presence of other SO_2 binding compounds. As the pH increases, the portion of SO_2 that is active against micro-organisms decrease. Therefore, an increase in the pH requires the addition of more SO_2 to maintain adequate antimicrobial activity.

There are three common forms of sulphur in wine: sulphur, sulphides and sulphites.

- **Sulphur (S):** Elemental sulphur is present in proteins and used on grapes to prevent rot.
- **Sulphides (H_2S and mercaptans):** Rotten egg smell produced by yeast and bacteria (reduced sulphur).
- **Sulphites (SO_2 and all its forms):** Oxidised sulphur.

There are also three forms of sulphite: molecular sulphur dioxide (SO_2), bisulphite ion (HSO_3^{2-}) and sulphite ion (SO_3^{2-}). These three forms can be bound to various compounds such as phenols, acetaldehyde and sugar, whilst the free forms exist in an equilibrium that is highly pH dependent (bound plus free equals total SO):

$$H_2O + SO_2 \leftrightarrow H^+ + HSO_3^- \leftrightarrow 2H^+ + SO_3^{2-}$$

ANTI-OXIDANT ACTION OF SO_2

- Prevents enzymatic degradation by inhibiting the enzyme polyphenol oxidase and slows down oxidation.
- Mechanism: Denaturation of the enzyme so it loses functionality.
- It combines with products of wine oxidation, such as acetaldehyde, quinones and peroxide which limit their damaging impacts in wine.

ANTI-MICROBIAL ACTION OF SO_2

Effective against bacteria and non-*Saccharomyces* (*Saccharomyces* species are generally more tolerant).

The yeast cell membrane allows molecular SO_2 to enter the cell. The higher internal pH causes dissociation and the resultant sulphites bind with proteins and enzymes to eventually kill the cell. Ions cannot enter the cell, hence only the molecular SO_2 generally present in smaller quantities, play an anti-microbial role. Since a lower pH results in more SO_2 present in the molecular fraction, pH management is key.

CATALOGUE

IOC SULFITANIN

Sulphur adjustment.

- Sulfitanin is a solution of ammonium bisulphate and tara tannin at 100 g/L of pure SO_2 and is used to adjust sulphur levels in must. In the must tank for white wine production, Sulfitanin prevents oxidation and microbiological alterations. For red wines in the maceration tank, red colour is extracted and stabilised with the use of the product.
- Application: Antiseptic action prevents the growth of indigenous undesirable yeast and bacteria; prevents oxidation; helps to extract colour; tannins reinforce the anti-oxidant mechanism of SO_2 and gives better structure and ageing ability, without increasing the astringency in white wines; stabilise the colour in red wines.
- Dosage: 50 - 80 mL/hL (white and rosé wine) or 50 - 100 mL/hL (red wine during maceration).
- SKU: 5 & 10 L

IOC INODOSE 5

Sulphur adjustment in barrels.

- Inodose 5 contains effervescent potassium metabisulphite tablets that release sulphur dioxide when added to must or wine.
- Application: For the easy adjustment of the sulphur in wines being aged in barrel; useful when low dosages of sulphur dioxide is required; allow gradual, uniform release of the required dosage of SO_2.
- Dosage: One tablet of Inodose 5 releases 5 g of SO_2.
- SKU: 42 tablets

CATALOGUE SUMMARY

PRODUCTS TO IMPROVE FERMENTATION

Glutathione solutions
IOC Glutarom

Yeast rehydration
Anchorferm
Anchor Revive

Nutrition
IOC Activit Nat
Natuferm Pure
Natuferm Bright
Natuferm Intense
Natuferm Fruity
Anchor Nourish
Anchor Conquer
IOC Activit

Detoxification & protection
Extraferm D'tox
Extraferm D'fend

YEAST FOR ALCOHOLIC FERMENTATION

Bioprotection
IOC Gaïa

Non-*Saccharomyces*
Fermivin VINEAE

White & rosé wine
Exotics Mosaic
Exotics Novello
Alchemy I
Alchemy II
Alchemy IV
Legacy VIN 2000
Legacy VIN 13
Legacy VIN 7
Legacy NT 116
Legacy WE 14
Legacy N 96
Fermivin 4F9
Fermivin XL
IOC 18-2007
IOC B 2000
IOC Fresh Rosé
IOC Twice
IOC Be Thiols

Red wine
Exotics Mosaic
Exotics Novello
Alchemy III
Alchemy IV
Legacy NT 202
Legacy NT 50
Legacy NT 116
Legacy NT 112
Legacy WE 372
Legacy WE 14
Fermivin VR5
Fermivin MT48
Fermivin A33
Fermivin XL
IOC R 9008
IOC Révélation Terroir

Restart fermentation
Fermivin Champion

BACTERIA FOR MALOLACTIC FERMENTATION

Co-inoculation
Anchor Duet Arom
Anchor Duet Soft
Anchor Duet Mature

Sequential inoculation
Anchor Solo Select
IOC Inobacter

ENZYMES TO IMPROVE PROCESSING & QUALITY

Clarification
Rapidase Clear
Rapidase Clear Extreme

Extraction & maceration
Rapidase Extra Press
Rapidase Extra Color

Process improvement
Rapidase Flotation
Rapidase Filtration
Rapidase Fast Color

Aroma extraction
Rapidase Expression Aroma
Rapidase Extra Fruit

Ageing & microbial control
Rapidase Batonnage
Delvozyme

PRODUCTS FOR FERMENTATION & CLARIFICATION

Clarification via settling
IOC Colorprotect V
IOC Colorprotect V MES
IOC Inofine V
IOC Inofine V MES

Clarification via flotation
IOC Qi'UP XC
IOC Colorprotect V
IOC Colorprotect V MES
IOC Inofine V
IOC Inofine V MES
IOC Bent'Up
IOC Acticarbone

Fining
IOC Qi Fine
IOC Qi No[Ox]

TANNINS TO ENHANCE WINE QUALITY

Anti-oxidant
IOC Essential Antioxidant
IOC Tanin Cristallin

Protect & stabilise colour
IOC Tanin Bouquet R36
IOC Tanin SR
IOC Fullcolor
IOC Essential PEP
IOC Essential PEL

Restore freshness & mask vegetal notes
IOC Essential Passion
IOC Essential Free veg

Enhance sensory characters
IOC Essential Oak Sweet
IOC Essential Oak Barrel
IOC Essential Oak Strong
IOC Privilège Bleu
IOC Privilège Noir

PRODUCTS TO FINE WINE

Remove heavy metals
IOC Trap'Metals

Organoleptic correctors
Extraferm D'tox
IOC Fyneo
IOC Colorprotect V
IOC Colorprotect V MES
IOC Qi Fine
IOC Acticarbone
IOC Otaclean
IOC Netarom
IOC Qi No[Ox]

PRODUCTS TO STABILISE WINE

Stabilising/protective arabic gums
IOC Inogum MF

Quality-improving arabic gums
IOC Flashgum R MF

Bentonites
IOC Bent'Up

MANNOPROTEINS TO IMPROVE WINE QUALITY

Pre-bottling & finishing
Final touch Pop
Final touch Tonic
Final touch Gusto

SULPHUR PRODUCTS TO PROTECT WINE

IOC Sulfitanin
IOC Inodose 5

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