



# Harvest Catalog Vol. II

Winemaking products



# Agrovin Spain and the world:

+ 60 years of experience

+ 200 employees

+ 5000 clients

+ 20 countries



● Network  
● Partners



Agrovin was founded in 1960 with the aim of supplying products for winemaking. At first, the company operated only in the Castile-La Mancha region from its headquarters in Alcázar de San Juan, a town in the province of Ciudad Real.

In 1965, the company began to expand within Spain and opened local offices throughout other country's top winemaking regions.

Today, the company operates in more than 15 countries. Beginning in 1985, Agrovin began to diversify into other sectors, such as beer, oils, mineral water, and the agri-food industry.

Agrovin has been expanding and modernizing its facilities. The company currently has more than 1,800 square meters of office space, more than 15,000 square meters of warehouses, and multiple in-house production plants throughout the world. It also has its own logistics network to ensure optimal distribution.

In its commitment to winemaking and to ongoing research advancements, Agrovin has the largest enological laboratory in Spain.

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Agrovin is the sector's first company to achieve compliance with quality standards in Spain.

In 2018, the company earned certification recognizing its achievement of the highest food safety standards.

It also has its own ENAC-accredited laboratory.



# Recommended products

## MICR STAB pH

### **Enhances microbiological stabilization of musts before alcoholic fermentation**

A microbiological stabilizer which helps to considerably reduce the bacterial load which affects wines and musts during fermentation as well as *Brettanomyces* populations.

P. 10

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## MICR STAB PROTECT

### **An alternative to SO<sub>2</sub> with an antimicrobial effect: Fungal Chitosan**

A specific formulation which combines antimicrobial, antioxidant and antioxidasic properties, proposed as an efficient tool to reduce sulphur dioxide levels during winemaking.

P. 11

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## Actimax *Regrowth*

### **A nutrient with fungal chitosan to improve yeast viability**

A state-of-the-art nutrient combining sources of nitrogen and growth factors with fungal chitosan.

P. 23

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## viniferm **ÉLITE**

### Very elegant varietal wines with personality

Strain resulting from the NUTRIAROMA research project "Development of winegrowing and oenological strategies and methods against climate change". This strain is ideal to increase the varietal descriptors of red wines. Its sensory profile enhances the terroir characteristics.

**P. 35**

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## Tanicol **REDSENSE**

### Sensory improvement in red wines

This new formulation, through the combination of different types of tannins, enhances the wine's color, provides greater protection and stabilization, improves the structure and body of the wine and intensifies the wine's red and black fruit aromas.

**P. 54**

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### Precision, speed, and integration

Toppings are the new line of oak alternatives designed to meet today's demands for aromatic precision, transfer speed, and immediate integration. Its innovative format allows treatments shortly before bottling.

**P. 58**

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## Proveget **PREMIUM**

### Plant protein (*Pisum sativum*) in liquid form

Due to a more environmentally friendly production process without drastic temperature changes, an extraction process is obtained that releases the protein from plant structures, allowing for a greater active fraction of soluble plant protein.

**P. 71**

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# Table of contents



## 1. Microbiological control and antioxidant protection

---

**Natural alternative to the use of sulphur dioxide**  
Microstab pH P. 10

---

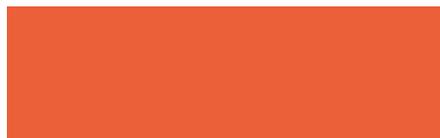
**Microbiological control of wines**  
Microstab Protect P. 11

---

**Freshness and aromatic intensity of white wines**  
Tanicol Blanc Excellence P. 12

---

**Antioxidant effect that protects wine aroma and delays ageing**  
SuperBouquet Evolution P. 13



## 2. Nutrients

---

**Organic nutrients. Faultless fermentation**  
Actimax Natura P. 19  
Actimax Varietal P. 20  
Actimax GSH P. 21

---

**Combined and inorganic nutrients**  
Actimax Plus P. 22  
Actimax Regrowth P. 23



## 3. Alcoholic fermentation

---

**Varietal yeasts for white wines**  
Viniferm Revelación P. 29  
Viniferm Diana P. 29  
Viniferm Elegancia P. 29

---

**Aromatic yeasts for white wines**  
Viniferm Aura P. 31  
Viniferm Pasión P. 31  
Viniferm Flora P. 31

---

**Aromatic yeasts for rosé wines**  
Viniferm Emoción P. 33  
Viniferm Diana P. 33  
Viniferm Revelación P. 33

---

**Yeasts for red wines**  
Viniferm Carácter P. 34  
Viniferm RVA P. 34  
Viniferm Sensación P. 34  
Viniferm TTA P. 34  
Viniferm Élite P. 35  
Viniferm 3D P. 36  
Viniferm CT007 P. 36

---

**Yeasts No Saccharomyces**  
Viniferm NSTD P. 37



## 4. Enzymatic precision

---

### Static clarification

Premium musts P. 40

---

### Enzymes for white wines

Enozym Extra Arome P. 42  
Enozym Lux P. 43

---

### Enzymes for red wines

Enozym Vintage P. 45



## 5. Flotation

---

### High-yield clean musts

Proveget FLOT P. 49  
Proveget PREMIUM P. 49  
Actimax XL P. 49



## 6. Structure and volume

---

### Tannins for fermentation and devatting

Tanicol Vintage P. 52  
Tanicol ONE P. 53  
MannoCROM P. 53  
MAnnoBLANC P. 53

---

### Sensory quality improvement during fermentation

Tanicol Red Sense P. 54  
Manno Arome P. 54  
Tanicol Red Vintage P. 55  
Tanicol Blanc Excellence P. 55



## 7. Oak alternatives

---

### Art of selection

Application formats P. 57

---

### Oak alternatives

Spirit products P. 58



## 8. Fining

---

### Selective fining agents

BCP XXI P. 69  
Triplex R P. 69  
Divergan P. 69

---

### Vegetable proteins

Proveget Bc P. 69  
Proveget Cristal P. 69  
Proveget Clar P. 69  
Proveget Fine P. 69  
Proveget 100 P. 69  
Proveget Quit P. 70  
Proveget Premium P. 71

# 01. Microbiological control and antioxidant protection

Monitoring the growth and development of polluting microorganisms is essential for obtaining a high-quality product that meets food safety standards.

The use of sulphur dioxide is currently widespread in most wineries due to its many advantages, such as the control of bacterial flora, the destruction of oxidase enzymes such as lacasse and tyrosinase, and its antioxidant effect, making it a key element in winemaking. However, its use can lead to technologically harmful effects such as:

- It's addition destroys Thiamine or Vitamin B1
- Hydrogen sulphide production at redox potentials below -70mV.
- Malolactic fermentation inhibition.
- Bleaching of anthocyanin.
- High doses can cause a spicy smell and unpleasant taste.

However, these are not the main problems when using SO<sub>2</sub>. The main drawback is related to its toxicity and its negative effect on health.

This is the reason why the last decade has seen an increase in the consumption of organic wines.

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<b>Natural alternative to the use of sulphur dioxide</b> Microstab pH	P. 10
<b>Microbiological control of wines</b> Microstab Protect	P. 11
<b>Freshness and aromatic intensity of white wines</b> Tanicol Blanc Excellence	P. 12
<b>Antioxidant effect that protects wine aroma and delays ageing</b> SuperBouquet Evolution	P. 13

## Table of antioxidant and microbial products

	MICR  STAB pH	MICR  STAB PROTECT	Tanicol <b>BLANC EXCELLENCE</b>	<b>SuperBouquet EVOLUTION</b>
Antimicrobial capability	● ● ●	● ● ●	●	
Antioxydante capability		● ●	● ●	● ● ●
Organoleptic effect	pH reduction	Neutral	Freshness and structure	Volume increase
Fungal chitosan	✓	✓		
Glutathione		✓		✓
Must	✓	✓	✓	✓
Wine	✓	✓	✓	✓
Format	Liquid	Solid	Solid	Solid
Organic certification	✓	✓	✓	✓

# MICROSTAB pH

## Microbiological stabilization of musts before alcoholic fermentation

**Microstab pH is a microbiological stabilizer which helps to considerably reduce the bacterial load which affects wines and musts during fermentation as well as *Brettanomyces* populations.**

**Microstab pH** when used prior to fermentation, Microstab pH does not interfere with the fermentative activity of saccharomyces yeast, while it works against lactic acid bacteria and other microbial populations which affect the organoleptic qualities of wines.

When applied before fermentation, even in sulphur dioxide-free preparations, it reduces the microbiological load and delays the start of malolactic fermentation.

**Microstab pH** can be used in musts and wines for the following applications:

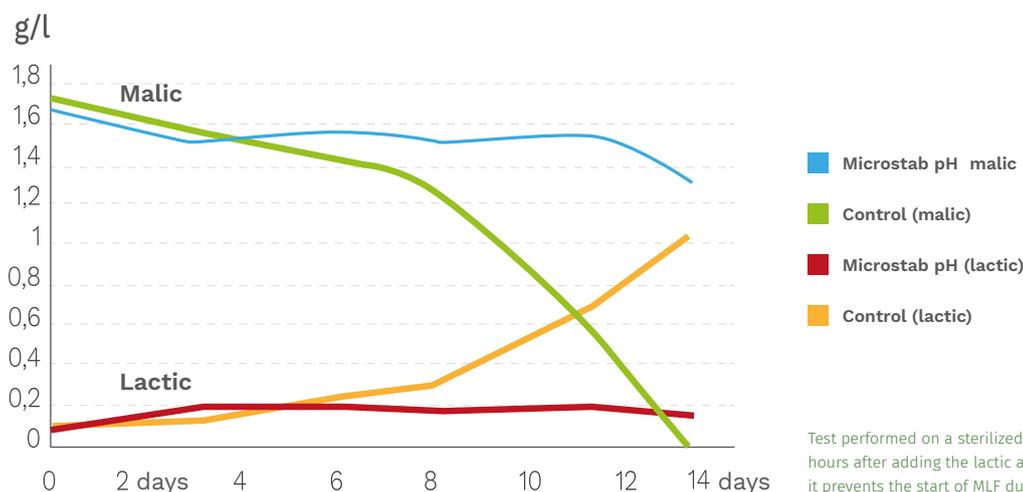
- To prevent bacterial contamination with a dosage of 1.9 - 3.8 L/1000 Gal.
- As a tool to control malolactic fermentation with a dosage of 5.7 - 7.6 L/1000Gal.
- Combined with SuperBouquet Evolution to efficiently reduce the addition of sulphites to wine

### Liquid format

The Chitosan is completely dissolved since it is prepared in an acid pH solution. This optimises its homogenisation and facilitates its addition both in tanks and when dosing with automatic dosing systems.



24 kg and 1200 kg packages.



Test performed on a sterilized must. Addition of 150 ml/hl of Microstab pH 24 hours after adding the lactic acid bacteria. Applied to must prior to fermentation, it prevents the start of MLF during fermentation.



## An alternative to SO<sub>2</sub> with an antimicrobial effect: Fungal Chitosan.

**A specific formulation which combines antimicrobial, antioxidant and antioxidasic properties. It is proposed as an efficient tool to reduce sulphur dioxide levels during winemaking.**

**Microstab PROTECT** can be used at any moment during the winemaking process as a substitute of, or in addition to, sulphur dioxide.

- Substantially reduces or completely removes *Brettanomyces* populations reducing the risk of alterations due to the presence of contaminating yeast.
- Effectively reduces lactic acid bacteria populations. Just like any other antimicrobial, the population reduction depends on the initial microbial load.
- Antioxidant and protective effect. A natural antioxidant, it protects the aromatic fraction and limits the browning of wines.
- Inactivates oxidation catalyts. Reduces oxidase enzyme activity, which is responsible for the oxidation of phenols.
- Reduces metal content (Fe and Cu).

### Antioxidant effect

Its high glutathione content, combined with the antioxidant effect of the gallic tannin, renders better results than when using glutathione alone.

### Antimicrobial effect

Very effective to control *Brett* populations without the need for sulphur dioxide.

The effect of **Microstab PROTECT** on lactic acid bacteria is also significant, as it can reduce populations below the desirable limits if problems caused by contamination are to be avoided.

### Especially recommended for

- **Wines with residual sugar.**  
Reduces the risk of contamination by lactic acid bacteria.
- **High pH.**  
When the sulphur dioxide is less effective.
- **SO<sub>2</sub> - free wines.**  
Complete alternative to the use of sulphur dioxide.
- **Reducing SO<sub>2</sub>.**
- **Brett control.**
- **Reinforcing antioxidant protection.**
- **Delaying or controlling MLF.**
- **Reducing oxidation.**

### Suitable for organic wines



# Tanicol **BLANC EXCELLENCE**

**Freshness and aromatic intensity of white wines.**

**Tannin with antioxidant effect, removes all oxidised and overripe fruit notes, improving the wine's ageing. Excellent in the refinement of white wines since it enhances the freshness and aromatic intensity.**

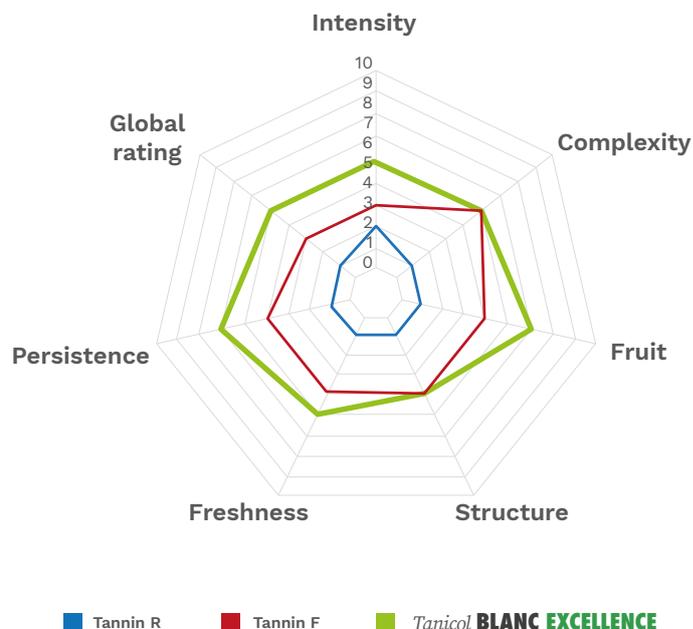
## Application

### For fining wine

- Restores youthfulness in white and rosé wines, increasing their freshness and aromatic intensity.
- Increases wine complexity and lifespan. Protects against color and aroma evolution.
- Restores citrus, lemon, grapefruit or fresh grass nuances, as well as thiolic notes, depending on the grape variety.

### During the winemaking process

- High antioxidant capacity, its high grape tannin content removes the bitterness or roughness. It helps limit the use of sulphur dioxide in white wines.
- Protects against the evolution of color and aroma.
- Provides the wine with an integrated and balanced structure.
- Increases the wine's aromatic profile, round and voluptuous, without bitter or astringent notes.



Comparative organoleptic study between **Tanicol Blanc Excellence** and other tannins for white wines. Dosage: 0.83 lb/1000Gal. Note the increase in aromatic intensity, freshness and persistence of flavor in the mouth when Tanicol Blanc Excellence is used.

## Dosage

### Desired effect

### When to apply

### Dosage (lb 1000 gal)

Increase aroma and phenolic potential	Must	0.083 - 1.25 (white and rosé wines)
Sensory quality improvement	Refinement	0.083 - 0.83 (white wines)

# SuperBouquet EVOLUTION

**Antioxidant effect that protects wine aroma and delays ageing.**

**This natural product with powerful antioxidant properties enhances wines' ageing potential.**

These are second-generation inactive yeasts, naturally rich in glutathione.

Its use is highly recommended in the production of white wine from very oxidative varieties rich in volatile thiols (Chardonnay, Sauvignon Blanc, Verdejo).

Its powerful antioxidant capacity reduces SO<sub>2</sub> levels during winemaking. It is especially indicated for the production of sulphite-free wines.

SuperBouquet EVOLUTION is the result of the VINNOSO<sub>2</sub> (INNPACTO IPT 2012-0967-060000) research project into ways of reducing SO<sub>2</sub> levels during the production process

## Application

- In the initial stages of alcoholic fermentation to allow the yeast to assimilate and synthesise the glutathione.
- At the end of alcoholic fermentation.
- During sur lie ageing and finished wines

For maximum protection with SuperBouquet EVOLUTION, avoid nitrogen deficiencies. We recommend using an organic nutrient (Actimax Natura) from the beginning of fermentation. Avoid applying ammonium salts.

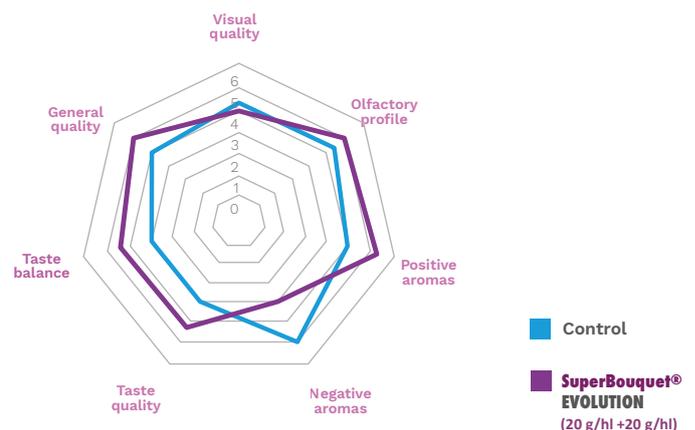
For wines with low SO<sub>2</sub> levels or without sulphites, we recommend managing dissolved oxygen and regularly checking the microbiology.

## Organoleptic qualities

Its natural oxidant effect does the following:

- **Protects color:** Restricts browning in musts and wines. Removes reactive quinones from must.
- **Protects aroma:** Helps preserve musts' and wines' aromatic fraction. Early application protects the volatile thiols formed during alcoholic fermentation that are particularly susceptible to oxidation.

Application during alcoholic fermentation increases expression of thiolic varieties' aromatic potential.



Monitoring of oxidation / evolution markers of rosé wine. The use of SuperBouquet EVOLUTION in fermentation, after 4 months of storage in the bottle at room temperature, without correcting the SO<sub>2</sub> levels, achieves a significant decrease in evolution / oxidation markers such as acetaldehyde, redox potential, coloring intensity and level of browning of the sample (OD 440 nm).

# 02. Nutrients

Successful alcoholic fermentation depends on yeast's capacity to function freely. Consequently, attaining the right balance between sugars and nitrogenous substances is critical to yeast population growth and achieving full expression of each strain's particular characteristics.

The nitrogen content in grapes and musts that yeast function depends on is expressed as yeast assimilable nitrogen (YAN). This nitrogenous content is made up of ammonium and all the assimilable amino acids except proline. Amino acids have a much higher nutritional value than ammonium. As a result, several of these, particularly arginine, play a key role at the end of alcoholic fermentation.

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**Organic nutrients. Faultless fermentation**

Actimax Natura	P. 19
Actimax Varietal	P. 20
Actimax GSH	P. 21

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**Combined and inorganic nutrients**

Actimax Plus	P. 22
Actimax Regrowth	P. 23

Product	Composition	YAN in ppm per 1#/1000gal	Thiamine	Amino acids	Properties
<b>Actimax®</b> <b>VARIETAL</b>	Fully autolysed yeast.	12,3	NO	● ●	Increases and protects the varietal character. Thiol profile.
<b>Actimax®</b> <b>NATURA</b>	Fully autolysed yeast.	17,5	NO	● ● ●	Aromatic precursor; nutrient. High contribution of arginine.
<b>Actimax®</b> <b>GSH</b>	Inactive yeasts naturally rich in glutathione.	2	NO	●	Prevents oxidation and browning; increases white and rosé wine longevity.
<b>Actimax®</b> <b>VIT *</b>	Inactive yeasts.	2	NO	●	Increases NTU in highly fined musts.
<b>Actimax®</b> <b>OENI</b>	Inactive yeasts; adds minerals, particularly Mg and Mn.	2	YES	●	Nutrient specifically designed to stimulate malolactic fermentation under demanding conditions.
<b>Actimax®</b> <b>Corcell</b>	Yeast hulls.	1	NO	NO	Removes toxins for stuck/sluggish.

YAN: Yeast-assimilable nitrogen (NH and amino acids, except proline).

(\*) Actimax VIT: 5 g/hl creates a contact surface equivalent to 30 g/hl of cellulose.

## Combined and inorganic nutrients

Product	Composition	YAN in ppm per 1#/1000gal	Thiamine	Amino acids	Properties
<b>Actimax®</b> <b>Regrowth</b>	Autolyzed yeast rich in ergosterol and growth factors. DAP, vitamin B1 and Fungal chitosan.	15	YES	● ●	Allows quick cell multiplication maintaining cellular viability for stuck/sluggish fermentations.
<b>Actimax®</b> <b>Plus</b>	Inactive yeast, DAP and Thiamine.	17	YES	●	Contains DAP and Thiamine.
<b>Actimax®</b> <b>Ferm</b>	Inactive yeasts and ammonium sulphate and phosphate.	18	YES	●	Wide-spectrum combined nutrient.
<b>Actimax®</b> <b>XI</b>	Inactive yeasts, DAP and cellulose.	18	YES	●	Nutrients and cellulose keeps yeast suspended.
<b>Actipasa®</b> <b>GREEN</b>	Ammonium phosphate	25	YES	NO	Facilitates cell multiplication.
<b>Actipasa®</b>	Ammonium sulphate	26	YES	NO	Facilitates cell multiplication.
<b>Actipasa®</b> <b>FAST</b>	Ammonium sulphate and phosphate	25	YES	NO	Facilitates cell multiplication.
<b>Diammonium phosphate</b>	Diammonium phosphate	25	NO	NO	Facilitates cell multiplication.
<b>Thiamine Dosage</b>	100% thiamine hydrochloride (vitamin B1)	0	YES	NO	Shortens cell latency period; lowers the keto acid index (pyruvic and ketoglutaric acid).

# ● Organic nutrients

## AGROVIN proposes nitrogenous recipes with high proportion of assimilable nitrogen in the form of amino acids.

### Good organic nutrient content enhances final fermentation and produces better quality wine

The nitrogen content in grapes and musts that yeast function depends on is expressed as yeast-assimilable nitrogen (YAN).

The minimum requirement for must fermentation is 150 mgN/l. This nitrogenous content is made up of ammonium and all the assimilable amino acids except proline.

Amino acids have a much higher nutritional value than ammonium. As a result, several of these nitrogen sources, particularly arginine, play a key role in yeast endurance at the end of alcoholic fermentation.

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### Arginine and formation of reductive aromas

Arginine molecules contain up to four nitrogen atoms, of which number at least three are assimilable during vinification. Arginine is the most common amino acid in musts and is what nourishes the cell during the final phases of fermentation.

This is firstly because it is assimilated very slowly and therefore remains in the must longer. Secondly, once inside the cell, it accumulates on the vacuoles until required during nitrogen metabolism.

Reduction is linked to a lack of nitrogen in general and to a lack of arginine in particular. This defect usually appears in the intermediate and final phases of fermentation, in which nitrogen content should comprise almost exclusively of this amino acid.

To synthesize the cysteine and methionine amino acids, the yeast takes in sulphur in the form of sulphates. These are present in the must and are first reduced to sulphites and then to molecular sulphur, to which the nitrogen backbone attaches.

In the absence of nitrogen, this sulphur remains in the form of H<sub>2</sub>S, which emerges from the medium, producing the characteristic and unpleasant rotten-egg odor. Adding the right amount of arginine prevents reduction occurring.

## Why is better to add the amino acids at the start fermentation?

The yeast assimilates the amino acids at the start of fermentation, when alcoholic strength is low. The amino acids enter the cells via specific membrane proteins, inserting protons (H<sup>+</sup>) and acidifying the cell interior. This effect is countered by expulsion of the protons (H<sup>+</sup>) against the gradient via another membrane protein (ATPase), which consumes energy.

As alcoholic strength increases, high numbers of protons flow in the direction of the gradient, forcing the membrane ATPases to work at full

capacity to prevent the medium acidifying. At this point, the cell halts the influx of amino acids to prevent more protons entering.

Calculations indicate that when alcoholic strength reaches 5% vol., amino-acid permease deactivation decreases by 80%. Consequently, it is advisable to add organic nutrients at the start of fermentation, ideally when rehydrating the yeast.

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## Advantages of exclusively organic nutrients

When ammonium and organic nutrients are added simultaneously, the yeast directly consumes the ammonium. This produces excessive cell multiplication and exhausts the yeast prematurely, giving rise to fermentation issues and reductive aromas.

Using exclusively organic nutrients (amino acids) at the start of fermentation prevents excessive cell multiplication, produces less hydrogen sulphide, increases aromatic intensity and enhances varietal characteristics.

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## Formation of fermentation aromas

Amino acids form the basis of the volatile compounds produced by yeasts. A third of the higher alcohols are produced by amino acids during the start of alcoholic fermentation.

Later, and in the presence of ethanol, they form fruity esters that have a highly positive influence on the wine's aromatic profile.

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## Enhancing varietal aromas

Amino acids also accentuate aromatic complexity by enhancing varietal notes. Adding the right amount of nitrogenous nutrients optimizes

performance of the enzymes (proteins) responsible for releasing the aromatic precursors present in the grapes:  $\beta$ -glycosidases and  $\beta$ -lyases.

## Initial correction of YAN with organic nutrition

The nutritional needs of yeasts depend mainly on the amount of fermentable sugar contained in the must, but there are also other factors that should be taken into account, such as the yeast strain.

The following table shows the amount of nitrogen generally required to complete fermentation:

### Suggested YAN (ppm)

Potential alcoholic	Low nutritional needs	Medium nutritional needs	High nutritional needs
13 %	157	175	210
13.5 %	163	182	218
14 %	169	188	226
14.5 %	175	195	234
15 %	182	202	242
16 %	194	215	258

For the nitrogen needs of each yeast strain, see the table on **page 25**.

# Actimax NATURA

Organic activator for alcoholic fermentation.

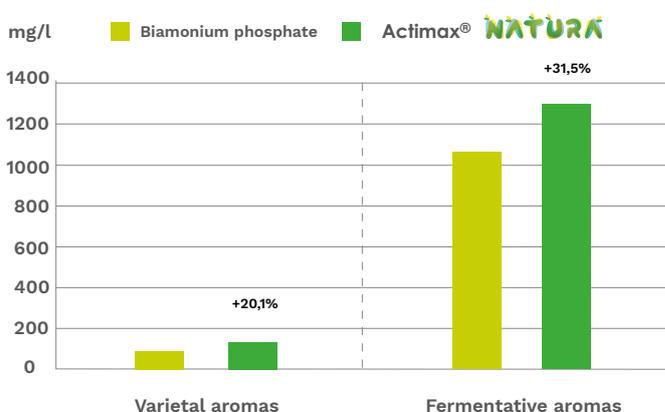
## Maximum aromatic expression and active release of amino acids.

Actimax NATURA is an organic nutrient for the alcoholic fermentation of grapes and must. It is a very rich source of organic nitrogen (free amino acids).

This alcoholic fermentation nutrient is a result of the research carried out as part of the CENIT-DEMETER (2008-2011) Project: "Winemaking and oenological strategies and methods against climate change. The application of new technologies that improve the efficiency of the resulting processes", within the specific lines of work carried out with the Rovira i Virgili University and the Spanish National Research Council (CSIC).



### Aroma enhancement



ENHANCED AROMA TEST: Study conducted on 2012-vintage Viura in La Rioja. Comparison between the aromatic profile of wine produced using organic nutrients rich in amino acids (Actimax NATURA) and that of another produced only with DAP input. 30% increase in the aromatic fraction.

### Organic correction of YAN

Traditionally, major YAN corrections could not be made using organic nutrition alone, but Agrovin now has a number of organic nutrients that increase the levels of nitrogen available in situations of severe nutritional deficiency.

#### YAN content (ppm)

Nutrient dosage	1LB/1000gal	2LB/1000gal	3LB/1000gal
Actimax NATURA	18	36	54
Actimax VARIETAL	12	24	36
Actimax Regrowth	18	36	54

# Actimax **VARIETAL**

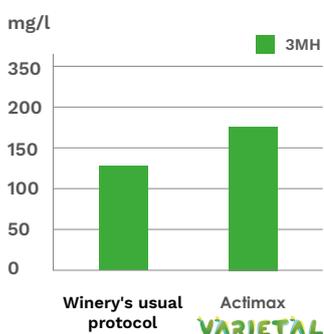
Organic activator for alcoholic fermentation.

## Maximum aromatic expression and protection of the thiol character released.

**Actimax Varietal** is a balanced organic nutrient for the alcoholic fermentation of grapes and must. It is a rich source of amino acids. The availability of amino acids optimises the organoleptic quality of wines and enables the formation of ( $\beta$ -lyase) enzymes responsible for the protection of the thiol character released.

Thiols are a group of over 50 compounds, including 4-mercaptomethylpentanone (4MMP), 3-mercaptohexanol (3-MH) and its acetate (Ac-3MH). Its presence in small quantities (with very low detection thresholds of the order of ng/l) contributes very positively to the organoleptic quality of wines, providing aroma descriptors such as boxwood, broom, passion fruit and citrus.

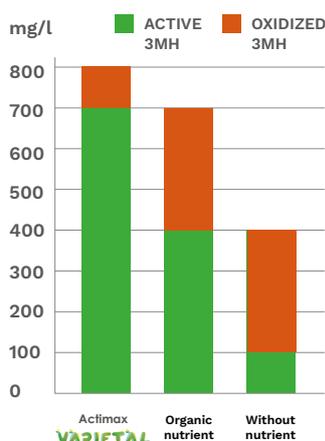
These thiols are found in grapes in their non-odorant form (thiol precursors) and only a few yeasts (with a high  $\beta$ -lyase enzyme activity, such as VINIFERM REVELACIÓN) enable their release expressing all the varietal potential with a thiol character. This family of compounds is especially sensitive to oxidation. Experimentally (vinification at an industrial scale) it has been shown that 50% of thiols released had already oxidised at the end of the alcoholic fermentation:



3MH thiol compound contents in their odorant (active 3-MH) form after using two vinification strategies for fermentation on wine must of the Sauvignon Blanc variety. Vintage of 2018.

Chilean winery test, vinification volume: 44 000 litres.

The high natural antioxidant capacity of **Actimax Varietal** allows the expression of the varietal potential with a thiol character of white and red grapes and also protects the released thiols from early oxidation. Excellent results have been obtained in the release and preservation of thiols in fermentation with Viniferm Revelación (yeast with a high  $\beta$ -lyase activity) and Actimax Varietal.



**Illustration 2:** Contents of 3MH thiol compounds in their odorant (active 3-MH) and oxidised or nonodorant (oxidised 3-MH) forms, following their use in the fermentation of three nutritional strategies on white must of the Verdejo variety. Vintage of 2017

This alcoholic fermentation nutrient is the result of research carried out as part of the NUTRIAROMA Project: "Nitrogenous nutrition and its effect on the release of thiol varietal aromas by yeasts, which has received financial support of the European Union through FEDER funds and of the CDTI (Ministry of Industry) (85% EU co-financing).

The project aims to obtain an extended view of how nitrogenous nutrition can affect the release of varietal aromas through enzyme activity of the yeasts responsible for revealing wine aromatic precursors during fermentation



# Actimax GSH

## High glutathione content.

## Organic nutrient used in alcoholic fermentation with high glutathione content that preserves white and rosé wines' freshness and aromatic properties.

Actimax GSH possesses antioxidant properties that protect color and varietal aromas (especially varieties high in thiols) in white and rosé wines.

It maximizes the grapes' aromatic expression while prolonging their freshness and delaying in-bottle color deterioration.

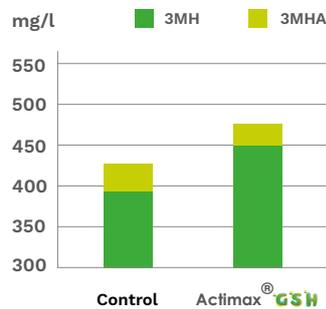
### Production and protection of thiols

#### Conversion

The emergence of perceptible aromas (volatile thiols) is the result of a reaction between the enzyme C-S lyase and its precursors.

This conversion generally has a very low yield of only 5-10% of the precursors available in the must.

#### Kinetics of C S lyase activity and 3MH production



Varietal volatile thiol content (4MMP, 3MHA and 3MH) after AF. Test performed on Sauvignon Blanc (2016, Chambre d'Agriculture de la Gironde).

The wine fermented in 30 g/hl of Actimax GSH shows a 22% increase in varietal volatile thiols when compared with the control.

Incorporation and conversion occur within the first three to five days and depends on several factors:

- Yeast strain and temperature (page 29).
- Nutrition: Ammonium salts inhibit both the incorporation of precursors and their transformation (Nutriaroma Project) into what is known as catabolic NH4 repression.
- The presence of active antioxidants in AF. Glutathione has a dual role in fermentation:
  - It protects thiols as they are released. The presence of glutathione during this release phase allows thiols to be preserved until the end of fermentation.
  - *Saccharomyces cerevisiae* is capable of producing GSH from its precursors during fermentation and releasing it during autolysis.

# ● Combined and inorganic nutrients

## Even and balanced kinetics

Ammonium salts increase yeast-assimilable nitrogen content quickly and effectively.

Because of their effect on cell multiplication, it is advisable to apply them after completion of the first third of alcoholic fermentation, once the yeast's growth phase has finished.

In addition to ammonium salts and amino acids, combined nutrients add other growth (vitamins and minerals) and survival factors (sterols and long-chain fatty acids).

They help to remedy nutritional imbalances, preventing increases in volatile acidity and heat in the must or pulp.

## Benefits of appropriate nutrient input

Effective under demanding fermentation conditions	Kinetic effects
<ul style="list-style-type: none"><li>• Low temperature production</li></ul>	<ul style="list-style-type: none"><li>• Prevents interrupted fermentation</li></ul>
<ul style="list-style-type: none"><li>• Highly clarified must</li><li>• Flotation</li></ul>	<ul style="list-style-type: none"><li>• Restarts interrupted fermentation</li></ul>
<ul style="list-style-type: none"><li>• High potential-alcoholic-strength grapes</li></ul>	<ul style="list-style-type: none"><li>• Removes toxic compounds</li></ul>
<ul style="list-style-type: none"><li>• High-volume fermentation</li><li>• Thermovinification</li></ul>	<ul style="list-style-type: none"><li>• Enhances AF</li></ul>
	<ul style="list-style-type: none"><li>• Improved MLF development</li></ul>

# Actimax<sup>®</sup> Plus

**Fermentation activator.**

## Increases YAN and reduces volatile acidity.

**Actimax Plus** is an alcoholic fermentation activator containing ammonium phosphate, inactive yeasts and thiamine.

Adding it to must increases yeast-assimilable nitrogen (YAN) content, creating an ideal combination of organic and inorganic nitrogen and significantly enhancing and accelerating yeast development in the medium.

Increasing YAN content favours yeast multiplication and ensures regular activity throughout the fermentation process.

Prevents the appearance of sensory defects associated with nutrient deficits, such as reduction problems: SH<sub>2</sub> and derivatives.

# Actimax *Regrowth*

**A nutrient that improves yeast viability during multiplication and promotes implantation.**

**It combines sources of nitrogen with growth factors, sterols, and fatty acids to meet the demanding nutritional needs of growing yeast.**

The production of biomass in intensive cell multiplication systems causes a high demand for easily-assimilated yeast nutrients in proportions that allow for maximum use.

Actimax Regrowth's specific formulation is developed to offer greater bioavailability in the components needed to allow yeast to express its maximum potential when a large number of generations are needed:

## Sterols and fatty acids

Rapid cell multiplication results in decreased levels of sterols and fatty acids in the lipid membrane, which weakens its resistance to ethanol in the final stages of fermentation. The additional impossibility of forming some sterols, like ergosterol, requires that they be added to ensure that the newly-formed yeasts can maintain a resistant plasma membrane with good fluidity and permeability.

## Growth factors

Minerals like Mg<sup>2+</sup>, Zn<sup>2+</sup> y Ca<sup>2+</sup> are essential for developing the metabolic functions of yeast.

## Ammonium source

A fast-assimilating nitrogen source is provided for the fast generation of new cells.

## Amino acids

Amino acids provide yeast with sufficient nitrogenous structures for the formation of enzymes, proteins, and other compounds needed for proper metabolism.

## Fungal chitosan

Fungal polysaccharide (*Aspergillus niger*) derived from chitin, which acts strongly on native yeasts and lactic bacteria. Its use significantly reduces the populations of microorganism contaminants and ensures the implantation of the selected strain.

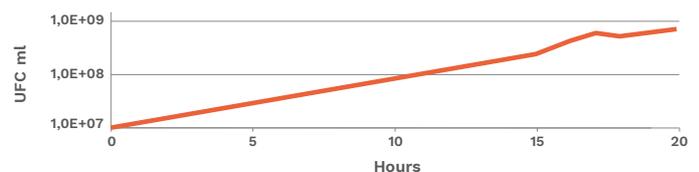
## Thiamine

This vitamin plays a role in the yeast's energy-production reactions. Adding it during the multiplication phase helps yeast to get the energy it needs for optimal development and growth.

Adding **Actimax Regrowth** during cell multiplication:

- Provides nitrogen, which is essential for yeast development.
- Improves the viability of the generated population.
- Promotes greater resistance to ethanol in yeast.
- Provides for safer fermentation.
- Lowers the risk of reduction and volatile acidity.
- Purifies the generated inoculum.
- Lowers the risk of indigenous microbiological contamination, which is mainly caused by lactic bacteria and *non-Saccharomyces* yeasts.

## Experimental results



Yeast population evolution during biomass creation using a Viniferm yeast at a dose of 0.7 g/l and Actimax Regrowth at a dose of 3 g/l.

# 03. Alcoholic fermentation

Use of yeasts, the microorganisms responsible for transforming must into wine, enhances varietal, aromatic and even regional characteristics - as well as those of winemaking techniques - and minimizes the risk of poor fermentation.

AGROVIN offers a wide variety of strains that have been selected for their fermentation performance and characteristics. Each strain is specifically designed for a particular style of wine and for the desired aroma and taste profiles sought. Our yeasts also take into account factors such as working temperature range, nitrogen requirement, influence on color, and alcohol production.

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#### Varietal yeasts for white wines

Viniferm Revelación	P. 29
Viniferm Diana	P. 29
Viniferm Elegancia	P. 29

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#### Aromatic yeasts for white wines

Viniferm Aura	P. 31
Viniferm Pasión	P. 31

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#### Yeasts for rosé wines

Viniferm Emoción	P. 33
Viniferm Diana	P. 33
Viniferm Revelación	P. 33

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#### Yeasts for red wines

Viniferm Carácter	P. 34
Viniferm RVA	P. 34
Viniferm Sensación	P. 34
Viniferm TTA	P. 34
Viniferm Élite	P. 35
Viniferm 3D	P. 36
Viniferm CT007	P. 36

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#### Yeasts Non-Saccharomyces

Viniferm NSTD	P. 37
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## Viniferm yeasts

In the last few years, AGROVIN has committed to selecting yeasts indigenous to the winemaking environment in Spain.

<b>viniferm® Yeasts</b>	<b>Ethanol tolerance (% vol.)</b>	<b>Usage temperature (°F)</b>	<b>Nutrient requirement</b>	<b>Alcohol production</b>	<b>Killer phenotype</b>	<b>Fructophilic yeast (var Bayanus))</b>	<b>Restarts interrupted fermentation</b>	<b>Enhances varietal</b>	<b>Fermentation profile</b>	<b>Increases structure</b>
<b>REVELACIÓN</b>	14 %	55-77	High	Medium	Killer	-	-	Yes	-	-
<b>DIANA</b>	14 %	55-77	High	Medium	Killer	-	-	Yes	Yes	-
<b>Elegancia</b>	15 %	53-77	Low	Medium	Killer	Yes	-	Yes	-	Yes
<b>AURA</b>	16 %	53-86	Medium	High	Killer	-	-	-	Yes	-
<b>PASIÓN</b>	14 %	57-77	Medium	Medium	Killer	-	-	-	Yes	-
<b>EMOCIÓN</b>	14,5 %	55-82	Low	Medium	Killer	-	-	-	Yes	-
<b>Sensación</b>	14 %	59-82	High	High	Neutral	-	-	-	Yes	Yes
<b>ÉLITE</b>	16 %	64-79	Medium	Medium	Killer	-	-	Yes	-	Yes
<b>RVA</b>	16 %	61-82	High	Low	Killer	-	-	Yes	-	-
<b>TTA</b>	14 %	64-82	Medium	Medium	Neutral	-	-	-	Yes	-
<b>Carácter</b>	15 %	61-82	High	Low	Killer	-	-	Yes	-	Yes
<b>CT007</b>	15 %	57-86	Medium	High	Killer	Yes	-	Yes	-	-
<b>3D</b>	15 %	64-82	High	Medium	Neutral	-	-	Yes	-	Yes
<b>911</b>	14 %	57-77	Low	Medium	Killer	Yes	-	Yes	-	Yes
<b>PDM</b>	16 %	53-77	Low	High	Killer	Yes	Yes	Neutral	Neutral	-
<b>BY</b>	17 %	50-77	Low	High	Neutral	Yes	Yes	Neutral	Neutral	-
<b>KLR</b>	16 %	53-86	Low	High	Killer	Yes	Yes	-	-	-
<b>522</b>	14 %	64-86	Medium	High	Neutral	-	-	Neutral	Neutral	-
<b>Start</b>	17 %	64-86	Medium	Low	Neutral	Yes	Yes	Neutral	Neutral	-

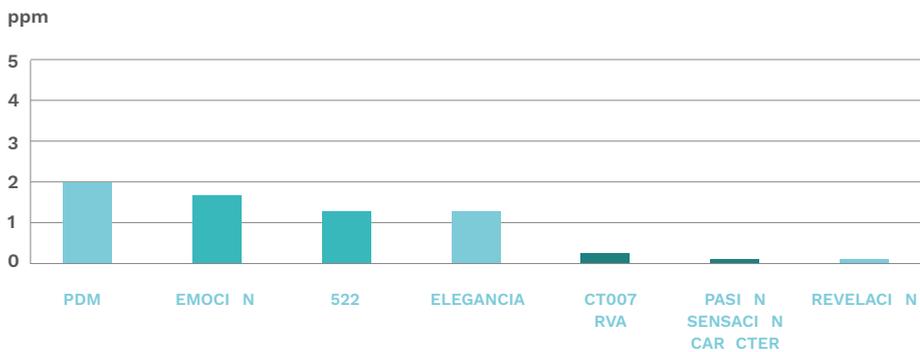


## Sulphur dioxide in wine

Sulphur dioxide's harmful effect on human health and the legal controls in place to keep usage below certain limits make reducing its use in wine advisable. However, none of the individual alternatives to sulphur dioxide fully match its properties — some products can equal its antimicrobial characteristics, while others have similar antioxidant and antioxidase properties. Furthermore, all of these alternatives have to be combined with winemaking techniques that reduce the

need for antimicrobial and antioxidant agents. Avoiding excessive contamination, selecting and using yeast strains that produce low volumes of SO<sub>2</sub>, correcting properties using ammonium-sulphate-free nutrients, using reasonable doses of thiamine, controlling the pH balance, protecting the grapes' and yeast's natural antioxidant properties (glutathione), or performing vinification under reductive conditions, among other options, are some of the alternatives.

## Sulphur dioxide production by several yeast strains. SO<sub>2</sub> free production



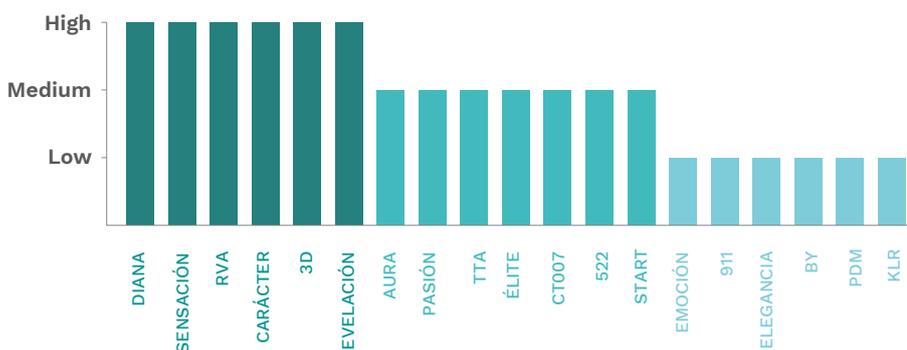
Low sulphur dioxide production is one of the key criteria applied when selecting Viniferm yeasts.

The REVELACIÓN, CARÁCTER, SENSACIÓN, PASIÓN, CT007, RVA, ELEGANCIA and EMOCIÓN yeasts all produce fewer than 2 ppm of SO<sub>2</sub> during vinification.

## Yeasts nitrogen requirement

To optimize alcoholic fermentation and maximize expression of the grape's properties, winemakers need to have an in-depth understanding of each strain's nutrient requirements. Not every yeast has the same nitrogen requirement. The more sophisticated the strain (e.g. produces fermentation aromas, releases varietal precursors, and produces and releases polysaccharides), the higher its requirement will be.

Likewise, as fermentation conditions become more demanding (e.g. cold fermentation, fining, and low pH), yeasts' requirement increases. Naturally, the grape or must's potential alcoholic strength, which determines the number of yeast generations, creates another set of requirements. For a probable alcoholic strength of between 12% and 14%, the nitrogen requirement increases by 20%.



**Viniferm yeast family nitrogen requirement.**

# Varietal yeasts for white wines

## Varietal character

### Thiol release

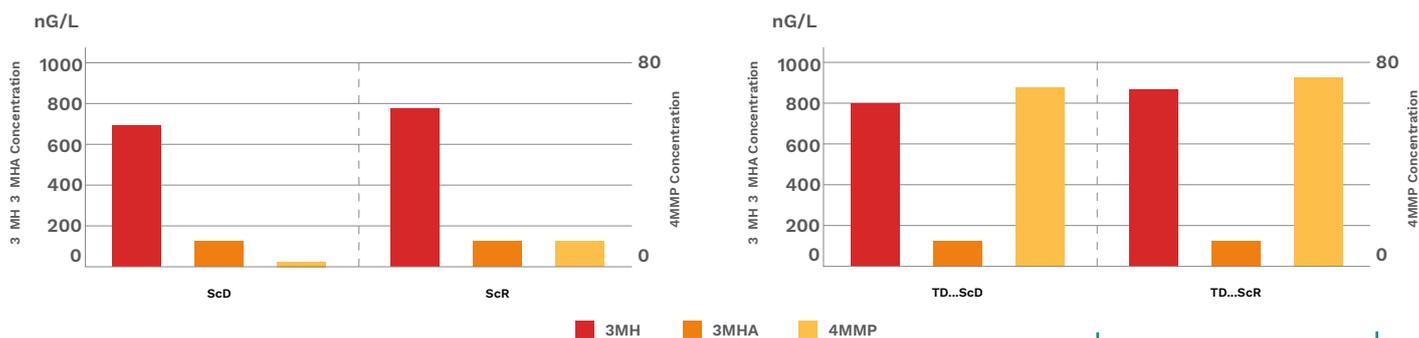
Thiol precursor release occurs during the first 3–5 days of alcoholic fermentation. It is closely linked to fermentation temperature (0.083 - 0.83 °F) (see graph: “impact of the different thermal profiles on the aroma of the wine”, down below in this page\*).

To achieve the best results, it is advisable to avoid excessive fining.

### Combined with **viniferm<sup>NS</sup>TD**

The combination of *Saccharomyces* with a thiol character in mixed culture with the *Torulaspora delbrueckii* NS-TD strain implies an overall increase in the characteristic thiol descriptors.

### Large release of 4 MMP in sequential inoculation with VINIFERM NS TD VINIFERM REVELACION



Fermentation with a single strain of *S. cerevisiae* Diana (ScD), fermentation with a single strain of *S. cerevisiae* Revelación (ScR). Sequential fermentation with *T. delbrueckii* NS-TD followed by *S. cerevisiae* Diana strain (TD...ScD). Sequential fermentation with *T. delbrueckii* NS-TD followed by *S. cerevisiae* Revelación strain (TD...ScR).

## What impact does thermal profile have on wine aroma

Wines produced using a **56°F thermal profile** have most fermentation esters, but fewest varietal thiols.

An **64 °F thermal profile** produces wines with most varietal thiol potential, but also produces fewest fermentation esters.

Wines produced using an **inverted thermal profile (64+56 °F)** have an intermediate aromatic profile and good concentrations of varietal thiols (3MHA) and fermentation esters. These are the most complex.

	56° F	64° F	64+56° F
Varietal thiols 4MMP, 3MH	●	● ● ●	●
Ac3MH	●	● ●	● ● ●
Fermentation esters	● ●	●	● ●

## viniferm REVELACIÓN

Full aroma. Varietal thiolic profile.

### Maximum thiolic expression.

- Produces highly complex and elegant varietal white wines. Suitable for inverted thermal profile fermentation.
  - Releases 4MMP and 3MH and converts 3MH into Ac3MH.
  - $\beta$ -Lyase activity.
  - **Wine profile:** Floral aromas, persistence and stable ageing in longerlasting wines.
- 

## viniferm DIANA

Ideal for varietal and or barrel fermented white wines.

### Production of thiolic and fermentation aromas.

- Ideal for production of high-quality varietal white wines (Verdejo, Sauvignon, Albariño, etc.).
  - Ideal for production of white wines using reductive treatments.
  - Releases 4MMP and 3MH.
  - $\beta$ -Lyase activity.
  - **Wine profile:** Fermentation and fruit aromas. Produces structured wines.
- 

## viniferm ELEGANCIA

Clean and flowery primary aromas, terpene release.

### Preserves the wine's varietal characteristics and enhances volume and silky mouthfeel.

- Specially recommended for production of varietal white wines.
- Cryophilic yeast with  $\beta$ -glucosidase activity. Recommended for low temperature fermentation.
- Flowery and primary aromas.
- **Wine profile:** Preserves the wine's varietal characteristics and enhances volume and silky mouthfeel.

# ● Aromatic yeasts for white wines

*Saccharomyces cerevisiae's* metabolism means it can produce higher alcohols from sources containing amino acids and sugars. The yeast combines these alcohols, via esterases, to form esters that have a highly positive impact on the wine's aromatic profile. The following compounds generated during fermentation affect wine aroma:

- **Higher alcohols:** Amino acids are deaminated to form  $\alpha$ -keto acids, which are decarboxylated into aldehydes and finally reduced to generate alcohols (isoamyl alcohol and 2-phenylethanol).
- **Alcohol esters:** These are produced by the reaction between acetylCoA and the higher alcohols (isoamyl acetate and hexyl acetate).
- **Fatty-acid ethyl esters:** These are obtained by ethanolysis from acylCoA, which forms during synthesis or degradation of fatty acids (ethyl butanoate, ethyl hexanoate and ethyl octanoate).

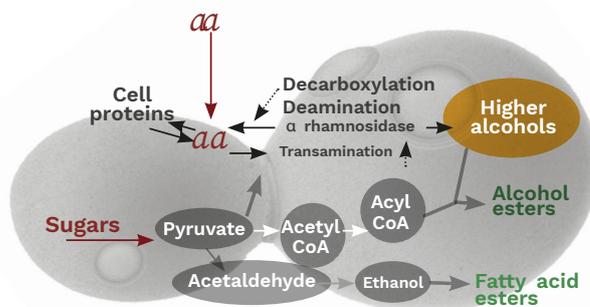
## Aromatic amino acid precursors

Although each aroma originates from a particular amino acid, direct synthesis does not occur on incorporation; rather the aromas are stored in the form of keto acids (deaminated), from where they proceed to protein synthesis.

The tendency to form one aromatic compound or another is determined principally by the yeast strain. Greater general availability of organic nitrogen facilitates aroma complexity and quality.

## The importance of yeast strain

The genetic tendency to form greater or lesser quantities of aromatic compounds during fermentation varies according to yeast strain. For example, the **PASIÓN** strain is characterized by high production of tropical aromas (2-phenyl acetaldehyde), whilst the **AURA** strain produces a large quantity of fruit esters with pineapple and banana descriptors (isoamyl acetate).



Amino acid		Alcohol		Ester		Aroma
Valine	→	Isotabunol	→	Isobutyl acetate	→	Apple
Isoleucine	→	Isoamyl	→	Isoamyl acetate	→	Banana
Leucine	→	Amyl	→	Amyl acetate	→	Banana and strawberry
Phenylalaline	→	Phenylalaline	→	Phenyl acetate	→	Rose

## viniferm **AURA**

Enhances amylic profile and fermentation reliability.

### High production of fermentation aromas.

- Ideal for neutral varietal white wines.
- Produces long-lasting aromas. Intensifies tropical fruit tones (pineapple and banana).
- Produces controlled fermentation in highly fined musts.
- **Wine profile:** Wines with a fresh and fruity aroma.

## viniferm **PASIÓN**

Tropical and fruity aromas.

### Highly stable esters and fermentation aromas over time.

- Ideal for production of white wines, particularly Airén, Palomino and Macabeo.
- Produces a wealth of ester-based aromatic compounds.
- Develops syrupy aromas, stewed notes and flowery nuances.
- **Wine profile:** Produces aromatic wines with tropical complexity.

### Maximum terpenic expression

Target	Product
Extraction of precursors	<i>Enozym</i> <b>LUX</b>
Aroma's production and preservation	Actimax <b>VÀRIETÀL</b>
Aromatic protection	<b>SuperBouquet</b> <b>EVOLUTION</b>

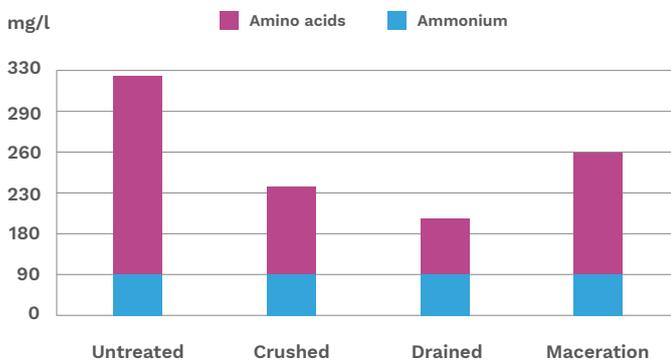
# Aromatic yeasts for rosé wines

## Specific fermentation issues

To ferment rosé musts, yeasts need an extremely clean medium that was fined after cold maceration, has very low turbidity, and was produced by pellicular maceration and pressing. They also need a significant cation charge (K+) and a low pH (3.2–3.5). Potential alcoholic strength is not usually low (> 12% vol.).

Fermentation challenges increase when the work protocol followed is non-specific (e.g. must bled off during red wine production). This raises the risk of interrupted fermentation when producing rosé wines and makes remedying it more difficult. Reduction is another of the most frequently encountered problems.

## YAN content in grapes and must



- YAN content in must is lower than in grapes.
- The must obtained from draining drastically reduces the YAN content.
- The ammonium content remains stable.
- The amino acid (organic nitrogen) proportion decreases.

## Nutrients: key factor in rosé wines production

Rosé musts are naturally poor in nutrients. Therefore, rosé fermentation benefits from nutrient input, above all in the form of inactive or autolysed yeasts (Actimax NATURA), which also provide vitamin and mineral supplements.

Their use eliminates the risk of reduction and produces a much more complex aromatic profile.

## Rosé comes in a range of colors

Rosé is not a monolithic wine — it encompasses enormous variety and a wide range of aromatic and color profiles. To extend AGROVIN's product portfolio and meet market demand for rosé wines, our R&D department has selected a new yeast strain specifically for high aromatic-intensity rosé wines designed to work under challenging conditions (low temperatures and highly fined must):

## viniferm EMOCIÓN

## High profile complex thiolic rosés

### Target

### Product

Aromatic production and increased volume

viniferm <sup>NS</sup>TD  
+  
viniferm REVELACIÓN

Aroma's production and preservation

Actimax VARIETAL

Thiolic protection

SuperBouquet EVOLUTION

## viniferm **EMOCIÓN**

**Intensely fruity rosé wines.**

**Excellent balance between amylic fermentation aromas and the rosé wine's fruity character.**

- Designed for low-temperature fermentation.
  - Produces amylic aromas.
  - Produces high-intensity rosé wines with persistent aromas.
  - Produces excellent fermentation kinetics.
- 

## viniferm **DIANA**

**Ideal for varietal rosés and/or barrel fermented white wines.**

**Release of volatile thiols, with the expression of floral fermentation aromas.**

- Ideal for varietal rosé wine production.
  - Recommended for very clean musts.
  - Enhances  $\beta$ -lyase activity.
  - Produces passion fruit aromas.
- 

## viniferm **REVELACIÓN**

**Full aroma. Varietal thiolic profile.**

**Release of volatile thiols.**

- Recommended for inverted thermal profile fermentation.
- Produces citrus fruit (grapefruit) aromas.
- Ideal for thiolic rosé wines.
- $\beta$ -Lyase activity.

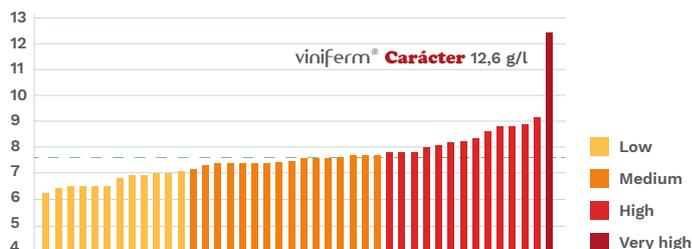
# ● Yeasts for red wines

## viniferem **Carácter**

### Varietal notes with hints of balsam.

- Recommended for production of premium red wines.
- Highly glyceric yeast strain, enhances body and mouthfeel.
- Accentuates fruity aromas (redcurrant, plum, raspberry and blackberry) and enhances mouthfeel.
- Ideal for Tempranillo, Grenache and Merlot

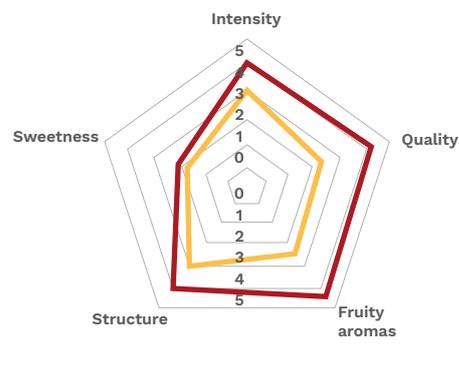
### Glycerol production (g/l)



## viniferem **RVA**

### Fruity aromas, structure and low alcohol content.

- Recommended for production of long-maceration red wines.
- Protects and increases color intensity in red wine vinification.
- Especially recommended for wines intended for wood ageing.
- Produces excellent results alongside co-inoculation with Viniferem OE lactic bacteria.
- Ideal for Merlot, Cabernet Sauvignon, Tempranillo.



Merlot wine from the 2018 Harvest. Alcohol by volume 15.8%

## viniferem **Sensación**

### Fruity profile and structured mouthfeel.

- Recommended for use in production of young, short-maceration red wines.
- Produces high levels of fruity fermentation esters (strawberry and cherry).
- Ideal for Syrah, Monastrell, Tempranillo.

## viniferem **TTA**

### Aromatic young red wines.

- Produces aromatic young red wines. Recommended for carbonic maceration and highly aromatic wines.
- Allows full characteristic expression of varietal aromas (red fruit: cherry, redcurrant and strawberry).
- Ideal for Merlot, Cabernet-Sauvignon and Tempranillo.

# viniferm **ÉLITE**

Allows for the terroir s characteristics to be elevated

## Ideal strain for increasing the varietal descriptors of red wines.

### Characteristics

- **More microbiologically stable wines:** fewer alterations (including *Brettanomyces*).
- **Wines without residual sugar:** its resistance to ethanol leads the alcoholic fermentation until the total exhaustion of sugar.
- **Less alcoholic wines:** its low sugar/ethanol content means it can be harvested at its optimum maturity.
- **Wines without reduced notes:** does not produce hydrogen sulphide, preventing reduction due to the lack of nitrogen in the medium and grape maturity.
- **Wines with a varietal cut:** release of thiyolic precursors, essential in red wines' aromatic palette.
- **Well-rounded wines, without sharp edges, with integrated tannin and a good ageing capacity:** as a result of its glycerol production and parietal lysis capacity.

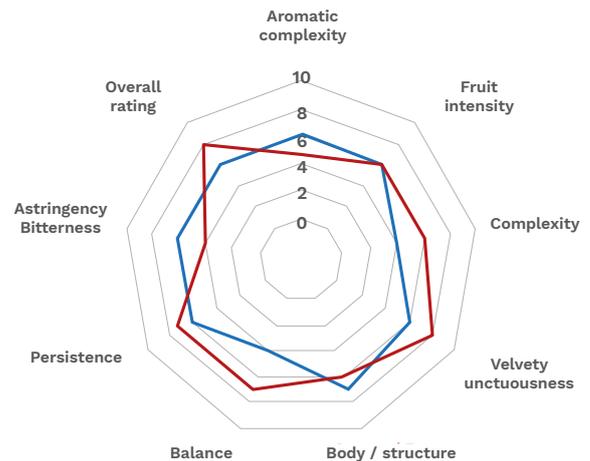
### Application

Structured and elegant red wines with a varietal cut produced from ripe grapes with a high alcoholic potential and subsequent ageing in wood.

### Origin

*Saccharomyces cerevisiae* var. *cerevisiae*.

Strain resulting from the NUTRIAROMA research project "Development of winegrowing and oenological strategies and methods against climate change" arising from the collaboration of Agrovín and the Complutense University of Madrid (2015-2017). Isolated from *Vitis vinifera* cv. Merlot vineyards in Bordeaux (France).



Control  
viniferm **ÉLITE**

Sensory profile of the Tempranillo variety.  
Probable ABV 15,5% vol. Temp. 61 - 75 °F

### Organoleptic qualities

#### Medium to high intensity wines

Highly complex and dominant varietal profile with red and black fruit predominance, with persistent floral notes.  
Absence of overripe notes.

#### Mouthfeel

Stands out in the mouth due to the good integration of the tannins providing volume and structure. High persistence.

### Oenologic properties

- Short latency phase.
- Fast fermentation speed.
- Ethanol resistance: 16%.
- Medium alcohol content.
- Average requirements in assimilable nitrogen, optimal results with **Actimax NATURA**.
- Low production of acetic acid.
- Low production of SO<sub>2</sub> and SH<sub>2</sub>.
- Excellent implementation in the environment, thanks to both its competitive capacity and for presenting the Killer phenotype.

## viniferm 3D

### Polysaccharide production.

## Intensifies the aftertaste, provides presence and volume.

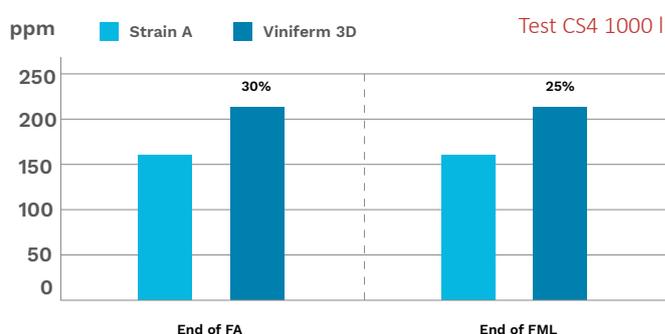
The high production of mannoproteins during fermentation and the post-fermentation phase gives the wine volume, roundness, and length.

This yeast for Mediterranean wines permits the development of aromatic and flavor characteristics of high-quality red grapes.

Wines made from ripe grapes that are high in ethanol and phenols require sufficient structure to prevent sensations of heat and drying or bitter notes.

Excellent for making red varieties such as Cabernet Sauvignon, Merlot, Grenache, or Tempranillo

### Mannoprotein release, comparison of yeast strains



Cabernet Sauvignon Harvest 2013.

Mannoprotein analysis was performed by isolating the wines' macromolecular fraction and then carrying out hydrolysis and analysis using HPLC. The samples were analysed twice, as per M. Quirós, R. Gonzalez and P. Morales, P. 2012. A simple method for total quantification of mannoprotein content in real wine samples. Food Chemistry 134:1205-1210.



Viniferm 30 is a product of the CENIT DEMETER programme conducted by the ICV (CSIC) and Bodegas Torres.

## viniferm CT007

### Stabilizes color.

## Ideal for pre-fermentation cold maceration. Production of stable pigments.

Pyranoanthocyanins are small molecules formed during fermentation by the reaction between malvidin and fermentation metabolites. These compounds remain stable over time because they are not affected by variations in pH, temperature or SO<sub>2</sub>.

This group of molecules includes vitisin A and vitisin B, two compounds that Viniferm CT007 synthesizes to produce greater color stability in wines to which it is added prior to fermentation.

enotecUPM  
Universidad Politécnica de Madrid  
Agrónomos, Tecnología de Alimentos

# ● Non *Saccharomyces* yeasts

viniferm NS TD

Designed for sequential fermentation.



Microbiology Department III.  
Universidad Complutense de Madrid.

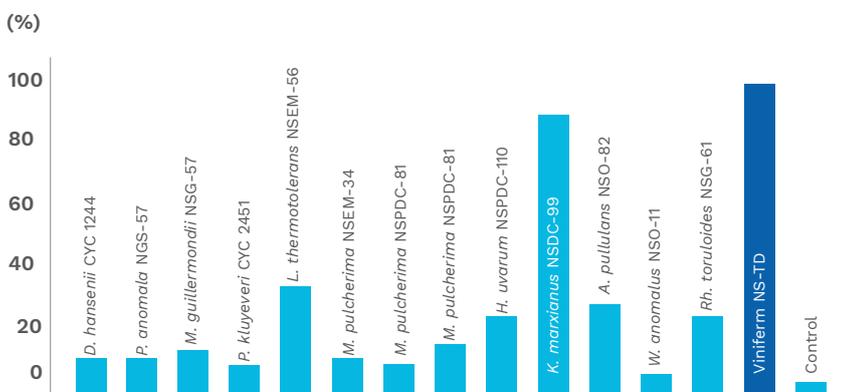
## Improved sensory quality and increased complexity in the smell and taste of wine.

Different types and species of yeasts present in the natural winemaking process are included in the Non-*Saccharomyces* group, and which are different from the fermentation species par excellence, the *Saccharomyces cerevisiae* (Figure 1). In recent years, the wine sector has turned to the use of sensory resources that offer this biological diversity. It is now known that the beneficial properties of these microorganisms must be specified at the strain level and not at the species level.

In this respect, the *Torulaspota delbrueckii* NSTD strain has unusual sensory features, demonstrated over several years of research.

However, this strain has, unlike other strains of its species, high prevalence in alcoholic fermentation, which enables it to be used in mixed culture from the start, along with the desired *S. cerevisiae* strain, thus facilitating the winery's work.

### 1. $\beta$ lyase activity of various Non-*Saccharomyces* yeasts

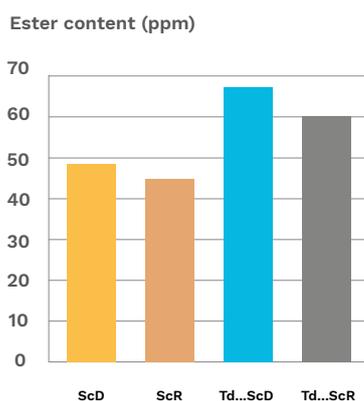


### Features

- Heightens mouthfeel and lengthens aftertaste.
- Produces more glyceric wines and increases the sensation of volume in the mouthfeel.
- Adds complexity and aromatic intensity.
- Extends longevity of tastes and aromas.

Figure 1:  $\beta$ -lyase activity of various nonSaccharomyces yeasts. The activity of Viniferm NS-TD stands out. Belda et al. (2006).

### 2. Production of fermentation aromas



### 3. Increased volume and reduced astringency

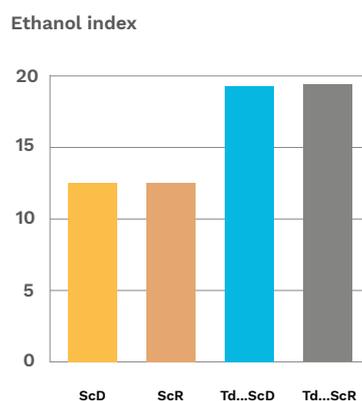


Figure 2: Fermentation ester concentration (mg/l), following fermentation using *S. cerevisiae* yeasts and combined with the NSTD strain. Belda et al. (2006) [1]. ScD: Viniferm Diana ScR: Viniferm Revelación Td...ScD: Mixed culture: Viniferm NS-TD + Viniferm Diana Td...ScR: Mixed culture: Viniferm NSTD + Viniferm Revelación.

Figure 3: Increase in the ethanol content which reflects the amount of tannins combined with polysaccharides. The higher this value, the more stable the coloring matter is and the lower the astringency. Belda et al. (2006) [1]. ScD: Viniferm Diana ScR: Viniferm Revelación Td...ScD: Mixed culture: Viniferm NS-TD + Viniferm Diana Td...ScR: Mixed culture: Viniferm NSTD + Viniferm Revelación. As can be seen, mixed inoculation yields higher rates than fermentation with a single *S. cerevisiae* strain.

# 04. Enzymatic precision

Enzyme preparations provide a highly precise tool with which to resolve wine-engineering issues and maximize use of the grape's aroma and color, allowing winemakers to optimize the particular features they seek.

In what could be considered winemaking's golden age, physical action on the grape and must has given way to use of much more specific and subtle microbiological and biochemical processes.

Enzyme preparations complement the enzyme activity already taking place in the grape and in the microorganisms affecting fermentation, acting in just the same way as they do.

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**Enzyme for white wines**

Enozym Extra Arome

P. 42

Enozym Lux

P. 43

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**Enzyme for red wines**

Enozym Vintage

P. 45

# Enovin / Enozym

They improve yields and the must's quality, they reduce working time, increase the aromatic potential, optimise colour extraction, refine the wine... there is a suitable enzyme for each objective. All the enzymes proposed by AGROVIN are free of cinnamyl esterase (FCE).

Product	Format	Activities	Applications	Dosage
<b>Enozym LUX</b>	Liquid solution	Polygalacturonase (PG) Pectin lyase (PL) Pectinmethylesterase (PE)	Cold settling. Skin maceration.	3.6-9 ml/Ton
<b>Enozym EXTRA AROME</b>	Liquid solution	Polygalacturonase (PG) Pectin lyase (PL) Pectin methylesterase (PE) $\beta$ -glucosidase	Pre-fermentation. Skin maceration.	3.6-7 ml/Ton
<b>Enozym Vintage</b>	Granulated	Polygalacturonase (PG) Pectin lyase (PL) Pectin methylesterase (PE) $\beta$ -glucanase Cellulase Pemicellulase	Color extraction and stabilization. Aromatic compound extraction.	38-114 g/1000g
<b>Enovin Clar</b>	Granulated	Polygalacturonase (PG) Pectin lyase (PL) Pectin methylesterase (PE)	Cold settling. Flotation.	38-114 g/1000g
<b>Enovin PECTINASE</b>	Liquid solution	Polygalacturonase (PG) Pectin lyase (PL) Pectin methylesterase (PE)	Flash détente.  Cold settling improved. Filtering.	>300 ml/1000gal  >75 ml/1000gal
<b>Enovin AI</b>	Liquid solution	Polygalacturonase (PG) Pectin lyase ( P L) Pectin methylesterase (PE)	Flotation.	>75 ml/1000gal
<b>Enovin CROM</b>	Liquid solution	Polygalacturonase (PG) Pectinlyase (PL) Pectin methylesterase (PE) Cellulase Pemicellulase	Color extraction.	>18 ml/Ton
<b>Enovin COLOR</b>	Granulated	Polygalacturonase (PG) Pectinlyase (PL) Pectin methylesterase (PE) Cellulase Pemicellulase	Color extraction.	>75 ml/1000gal
<b>Enozym GLUCAN</b>	Granulated	$\beta$ -1,3-glucanase $\beta$ -1,6-glucanase	Treatment of musts and wines affected by rot. Fine sur lie ageing.	114g/1000gal
<b>Enovin Varietal</b>	Granulated	$\beta$ -glucosidase	Release of varietal aromas.	190 g/1000gal

\* The dosage applied should be optimized to account for temperature, application time and grape variety

## Static clarification of premium musts

Static clarification is the term used to describe sedimentation of suspended solids under the action of gravity. It occurs naturally unless interrupted by the start of fermentation. The time required to complete must clarification is equivalent to the time it takes for the smallest particles to sink from the top of the vat to the bottom. In this process, gravity is not the only factor that needs to be taken

into account; particle interaction also needs to be considered, as movement of the liquid around these and the repulsive force between the charged particles can reduce the speed of downward movement. The presence of colloidal polymers, such as polysaccharides and proteins (which pass a positive charge to the must and alter its pH), hinders precipitation.

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### Importance of pectin lyase activity to rapid clarification

Pectin lyase (PL) facilitates clarification by removing the pectin in larger pieces and accelerating solids' downward movement. This increases fining performance.

Mature grapes contain abundant PME and PG, but do not contain PL. Provoking this enzyme activity accelerates fining.

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### Pellicular maceration

Pre-fermentation maceration in white grape vinification consists of reducing the temperature of the destemmed and crushed grapes to favor extraction of the peel's aromatic compounds and that of other compounds that give the wine structure.

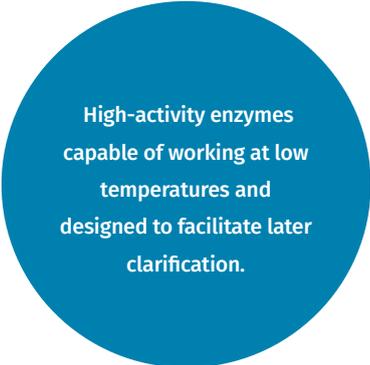
Refrigeration has to be done quickly (within a maximum of 3 hours) and the temperature needs to be stabilized at around 40 °F (it must

never exceed 46 °F) to prevent fermentation and enzyme oxidase activity starting. Maceration should be performed at low sulphur dioxide concentration (30-40 ppm), as this acts as a solvent, and should last between 12 and 24 hours (inert atmospheres are highly beneficial). If not performed correctly, this technique can raise the must's polyphenol content, which increases color and astringency.

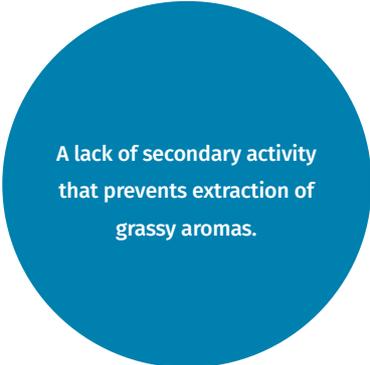
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### Requirements

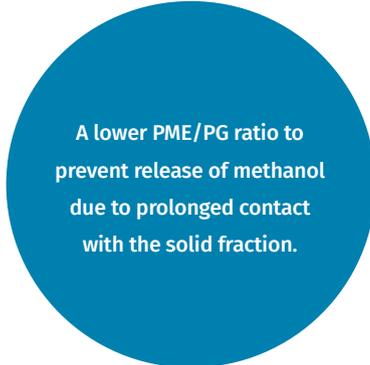
Under these conditions, not all pectolytic enzymes are effective. They require:



High-activity enzymes capable of working at low temperatures and designed to facilitate later clarification.



A lack of secondary activity that prevents extraction of grassy aromas.



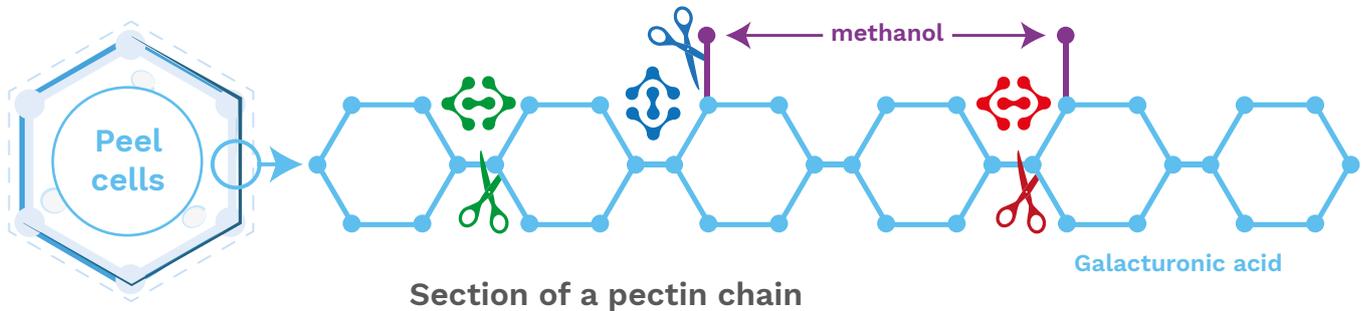
A lower PME/PG ratio to prevent release of methanol due to prolonged contact with the solid fraction.

## Clarification mediated by pectolytic enzymes

Pectinases combine three synergic enzyme activities. The key activity is performed by pectin galacturonase (PG), which degrades the units of galacturonic acid in the pectin chain. This activity requires prior action by pectin methyl esterase (PME), as the PG can only work on the free carboxylic functions of the galacturonic acid units.

Pectin lyase (PL) removes the pectin in larger pieces and accelerates the overall fining process.

## Pectinase action mechanism



- PECTIN METHYL ESTERASE (PME)
- POLYGALACTURONASE (PG)
- PECTINLYASE (PL)

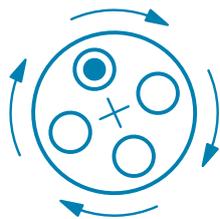
The PL rapidly reduces must viscosity. The PG requires preliminary action by the PME, and results in complete pectin solubilization.

## Pectin test

Removing all the pectin from the must before racking helps to clean the must more quickly and also clarifies and filters the wine once alcoholic fermentation is complete.



1. 10 ml of must.



2. Centrifuge.



3. Add 1% HCl in 10 ml alcohol to the supernatant.



4. Wait 10 minutes.



5. The test is positive if gelatinous flecks appear.

# ● Enzyme for white wines

## Enozym EXTRA Arome

Dose:  
-9 ml  
/Ton

Maximizes precursor extraction and aroma release.

Designed for skin maceration and settling.  
Releases varietal aromas. Acts quickly to reduce the risk of oxidation.

— Enzyme activity: Highly concentrated pectinase (PL) and  $\beta$ -glycosidase.

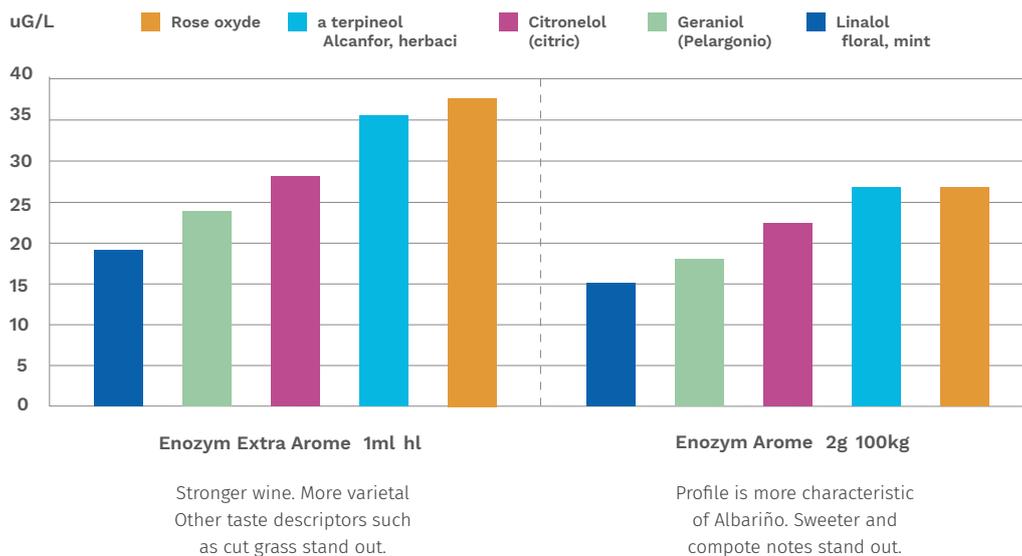
— Can be applied directly to grapes.

— Purified and concentrated enzyme preparation designed to facilitate release of aromatic precursors.

— Performs rapid depectinization at low temperatures.

Use of Enozym Extra Arome for the extraction of varietal aromas in Albariño. Vendimia 2017.

GC calculation of aromatic compounds terpenes class .



Using half a dose of **Enozym Extra Arome** (37.8ml/1000Gal) an increase of 36% is obtained in the main monoterpenoles compared to Enozym Arome (88 g/Ton).

Wines have a wide variety of aroma compounds and monoterpene alcohols stand out. They have very low sensory thresholds, with positive descriptors such as floral, pink, citrus, etc. and with an

important synergistic effect (their mixture has a lower olfactory perception threshold than isolated monoterpenes).

# Enozym LUX

Dose:  
15mL/  
1000Gal

Highly concentrated liquid enzyme for fast fining.

## Rapid fining at low temperatures. Produces clean and stable aromas.

Enozym LUX is an easily applied liquid preparation with a high pectin lyase (PL) content that, at very low doses, produces clear high-yield musts. It enhances aroma stability and intensity.

It combines the various pectolytic activities (pectin lyase, polygalacturonase and pectinesterase) in a balanced proportion to optimise must properties preservation.

— Enzyme activity: Highly concentrated pectinase.  
Rich in pectin lyase.

— Purified and concentrated enzyme preparation (FCE).

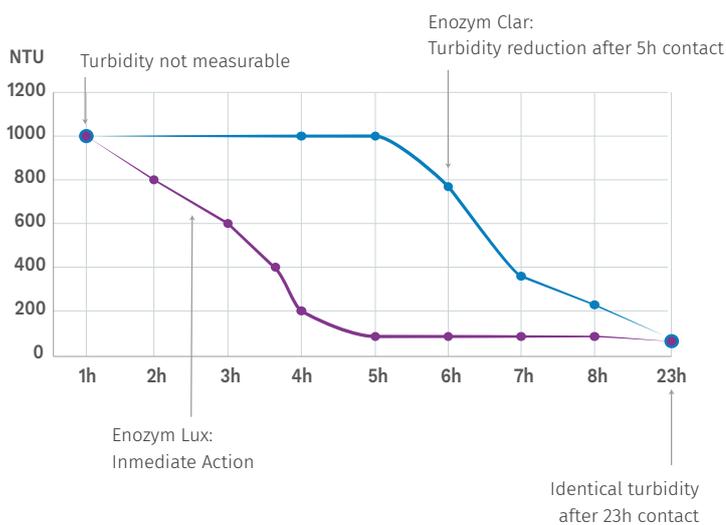
It has a low pectin methylesterase (PME) content, so it can be used during pressing or in the maceration vat.

Enozym LUX is a purified preparation without secondary activities. As it is free of cinnamyl esterase (FCE) activity, the release of vinylphenols is limited.

— Performs rapid depectinization at low temperatures.

— Can be applied directly to grapes.

## Static clarification using Enovin CLAR and Enozym LUX.



Enovin CLAR  
■ Enozym LUX

Turbidity (NTU) after treating Verdejo variety must at 46 °F.  
Samples taken from the lower section of the vat (sampling outlet).

# ● Enzyme for red wines

## Color extraction

Phenolic compound extraction does not depend only on the amount of these compounds in the grapes. The walls of the berries' cells form a barrier that prevents anthocyanins, tannins and other polyphenols moving from the grapes to the wine.

As the grapes ripen, the polysaccharides in the peel's cell wall solubilize. Progressive degradation of cell walls during ripening facilitates colorant extraction during vinification.

## Enzymes effect during maceration

Applying enzymes hydrolyses the wall of the peel, releasing anthocyanins and tannins in the aqueous phase of alcoholic fermentation. These have several marked effects.

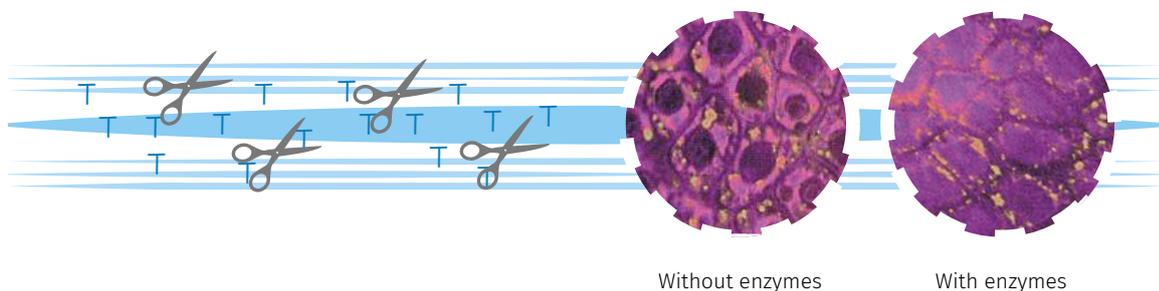
- They act on the grape's peel, degrading the polysaccharide components and favoring inter- and intra-cell disaggregation and facilitating tannin release.
- Facilitate release of its anthocyanin and aroma content.
- They act on the proteins in the vacuole membrane and, by degrading it.
- They establish a balanced polyphenol/anthocyanin ratio in the must.
- Finally, they also extend the length of time the wine maintains its color and aroma intensity.

## Secondary activity s importance to color stabilization and extraction

Enzyme preparations used in wine maceration facilitate the following:

- **Pectolytic activity (PG, PL, PME):**  
Breaks down pectins and releases less astringent tannins bonded to the wall.
- **Cellulase and hemicellulase activity: ( $\beta$ -glucanase):**  
Break down vegetable walls, releasing the polyphenols bonded to them.
- **Protease activity:**  
Breaks down the membrane proteins and releases vacuolar tannin. Proteases are also effective against wine proteins extracted during maceration, restricting their capacity to precipitate tannins.
- **Absence of cinnamyl esterase (FCE):**  
Collaborates in formation of volatile phenols, causing significant sensory defects.

## Peel cells after FA



# Enozym VINTAGE

Dose:  
37.8 g/  
1000 Gal

## Enhanced color extraction and stability

### Extracts and stabilizes colorants. Produces long-lasting aromas.

- Enzyme activity: Pectinase, cellulase, hemicellulase, protease and  $\beta$ -glucanase.
- Enhances structure and stability in treated wines by performing balanced extraction of tannins, anthocyanins and polysaccharides.
- Enhances wine pressing and filterability.

**Enozym VINTAGE:** Enzyme preparation designed not only to enhance color extraction, but also to improve ageing and stability over time. In addition to usual enzyme activity (pectinolytic, cellulase and hemicellulase), it also features  $\beta$ -glucanase activity, which breaks down glucans in the vegetable wall and extracts parietal polysaccharides of fungal origin.

## Color stability

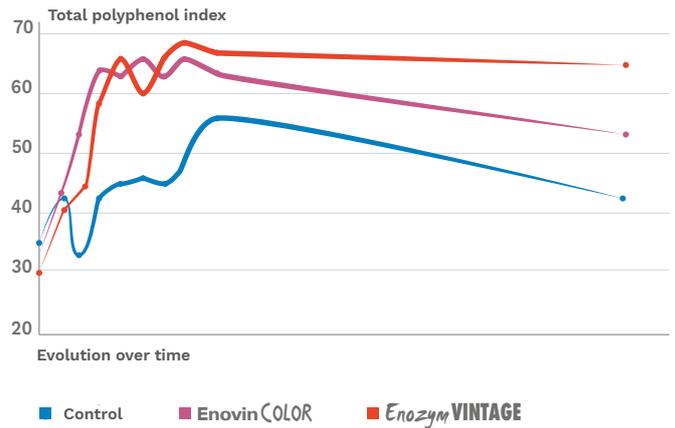
During maceration, winemakers not only endeavour to maximize phenolic compound extraction, but also to maintain phenolic stability over time. This is especially important in wines intended for ageing.

### Why use an enzyme preparation that boosts $\beta$ glucanase activity

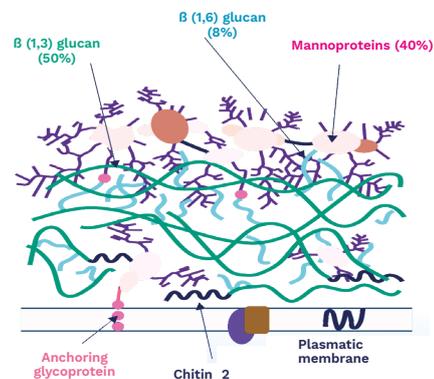
Because it increases bleed-off and pressing yield and enhances fining and filtering. It also prevents turbidity and later filter silting. Enzyme preparations are particularly recommended for unevenly ripened and lower-quality vintages.

### When added

Around 50% of glucanase activity occurs at the wine's pH, while only 10–15% of activity occurs at 50 °F. It is not particularly sensitive to  $\text{SO}_2$ , but activity halves in the presence of normal ethanol levels. Consequently, the best moment to add the product is during fermentation when the temperature and alcoholic strength will not restrict the enzyme's normal function.



Enzyme preparation influence on color parameters. With both preparations, faster and greater polyphenol extraction is observed. With **Enozym VINTAGE**, the polyphenolic component performs better.



## Did you know

Yeast's cell wall is not solely for protection; its biochemical composition is essential to transforming must into wine. It accounts for between 15% and 30% of the cell's dry weight. It is composed mainly of  $\beta$ -glucan (50%–60%) and mannoproteins (35%–40%),  $\beta$ -glucan is the principal polysaccharide responsible for maintaining the shape and rigidity of the yeast's cell wall.

During budding, hydrolysis led by endogenous  $\beta$ -glucanases found in yeast occurs, releasing mannoproteins into the medium.

# 05. Flotation clarification

Flotation allows for continuous clarification and stabilization of large quantities of must, notably lowering treatment costs and limiting the impact on the environment.

Flotation is a separation technique that, like decanting, takes advantage of the difference in weight between the liquid and the particles within it. However, while in decanting solid substances have a specific weight greater than that of the liquid, the opposite is true in flotation, causing the particles to move more quickly from the bottom to the top.

Sludge and phenolic compounds can easily be reduced, which is essential for the final quality of the must.

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#### High-yield clean musts

Proveget FLOT

P. 49

Proveget PREMIUM

P. 49

Actimax XL

P. 49

Coadjuvant	Dosage	Composition
<b>Proveget FLOT</b>	1.8-7.5 L/1000gal	Vegetable protein and derivatives of chitin in liquid form. <b>Non-animal origin</b>
<b>Proveget PREMIUM</b>	1.8-7.5 L/1000gal	Pure vegetable protein with great reactivity. <b>Non-animal origin</b>
<b>Enovin FL</b>	75-150 ml/1000gal	High-pectin-lyase-content (PL) enzyme. <b>Non-animal origin</b>
<b>Vinigel FL</b>	200-945 g/1000gal	High-molecular-mass gelatin.
<b>Vinigel CRISTAL</b>	1-3 L/1000gal	
<b>Maxibent FL</b>	454-1,400 g/1000gal or 1-3 lb/1000gal	Activated calcium bentonite <b>Non-animal origin</b>
<b>Silisol</b>	375-1125 g/1000gal	Silica gel. <b>Non-animal origin</b>



## Performance System

To optimize the flotation process, Agrovín has developed Performance, a flotation system that continuously clarifies and stabilizes large quantities of must, significantly reducing the treatment costs of the processed product and limiting the impact on the environment.

In all the tests carried out with the Performance flotation system, racking is performed with high yield and great rapidity to obtain a clear must with low turbidity.

The resulting wine is not different from those using traditional racking techniques, showing that this technique does not cause any oxidation when air is used as a gas.

# ● High-yield clean musts

The flotation technique is used to separate solids from a liquid by carrying them up to the surface of the medium on gas bubbles. It is a fast, high-yield way of fining must.

The effectiveness of its contribution to wine quality in vintages affected by rot or high temperatures is indisputable.

Flotation reduces the quantity of solids in suspension in must. It can be performed as a continually applied process and needs few adjuvants.

In short, it is an effective and low-cost procedure.

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## Flotation principle

Flotation is a fining technique that exploits the characteristic behaviour of particles in suspension. If a particle comes into contact with a gas bubble, a solid-gas complex is formed with a lower density than that of the liquid surrounding it. This complex tends to float to the surface of the liquid, from where it can be removed.

## What does the flotation clarification process involve?

### 1. Must viscosity reduction:

Particle separation is a function of particle diameter and is inversely proportional to the medium's viscosity. Viscosity can be reduced by adding pectolytic enzymes that break down the pectins into smaller fragments. Agrovin's Enovin FL flotation enzyme preparations have a high pectin lyase (PL) content.

The flotation process begins by adding pectolytic enzymes to the untreated must and leaving these to act for at least 1.5 hours.

### 2. Floccule formation:

Adding gelatin to the juice forms floccules with the must's turbids. It is essential to add gelatin (PROVEGET or VINIGEL) are strongly suggested, all the other adjuvants are optional and use depends on required yield.

Next, gas is injected into the must.

### 3. Particle transfer to the surface:

The must is pressurized to dissolve the gas and, when it is depressurized, small bubbles form that have a lower density than the surrounding liquid. These bubbles tend to rise to the surface, carrying the particles requiring removal with them.

## Flotation adjuvants

As the undesired particles in the must are neither polar nor non-polar, their floatability can be improved by adding flocculants that decrease their polarity.

- **High-molecular-mass gelatin:** increases consistency and prevents floccule breakdown due to electrostatic interaction.
- **Specific plant proteins:** A good alternative to animal adjuvants.
- **Flotation-specific bentonite:** Improves the consistency of flocs and increases yield.
- **Silica gel:** helps compact lees.

## Proveget *FLOT*

**Plant based clarifier for must flotation.**

### Reduced polyphenols and high aggregation power.

This clarifier improves the consistency and rate of floc formation by combining the electrostatic characteristics of the plant protein with those of chitin glycan, a highly charged polysaccharide.

As a result, particles are removed from the must more quickly, including potentially oxidizable elements.

Improving floc aggregation significantly improves yield.

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## Proveget *PREMIUM*

**Environmentally friendly plant based clarifier for must flotation.**

### High buoyancy and fewer potentially oxidizable polyphenols.

A new liquid clarifier based on 100% pea protein. Its innovative extraction process produces a more reactive protein with the must sediments, allowing for rapid clarification.

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## Actimax *XL*

**Alcoholic fermentation activator.**

### For optimum fermentation in highly clarified musts and large capacity tanks.

It includes cellulose to improve cell dispersion and the subsequent compaction of lees.

Adding it to the must, it increases the Yeast Assimilable Nitrogen ensuring the ideal organic and inorganic nitrogen complement, significantly improving the medium conditions for the yeast's rapid growth, shortening the lag phase and ensuring the inoculated strain's prevalence against the indigenous population.

Prevents the appearance of sensory defects associated with nutrient deficiencies such as reduction problems: SH<sub>2</sub> and derivatives.

Reduces the appearance of volatile acidity and improves the content of aromatic esters.

Inactive yeasts also supply sterols and long-chain fatty acids, which are cell resistance elements. They also protect the yeast by fixing toxic inhibitors such as C8-C12 fatty acids or pesticide residues.

# 06. Structure and volume

Polyphenolic compounds play an important role in the sensory properties of wines. A proper balance contributes to enhanced structure and aroma profile.

Oenological tannins are divided into two categories:

- **Condensed tannins or proanthocyanidins:** These provide excellent antioxidant protection and color stabilization, as well as increasing wine structure and body. Their high polymerization capacity helps protect color stability.
- **Hydrolysable tannins or phenolic acids:** These are specifically selected gallotannins and ellagitannins that act as excellent antioxidants and powerful fining agents while preventing risk of overfining. In an acidic medium like wine, they readily hydrolyse, releasing phenolic acids (e.g. gallic, digallic — or tannic — and/or ellagic acid) depending on the botanical species the extract is made from.

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#### Tannins for maceration and devatting

Tanicol Vintage	P. 52
Tanicol ONE	P. 53
MannoCROM	P. 53
MAnnoBLANC	P. 53

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#### Sensory improvement in maceration

Tanicol Red Sense	P. 54
Manno Arome	P. 54
Tanicol Red Vintage	P. 55
Tanicol Blanc Excellence	P. 55

## Structure and volume

Polysaccharides and polyphenols hold the lock and key to creating body in wine. Achieving the right balance between anthocyanins and tannins improves both color stability over time and wine structure.

Increasing the polysaccharide and mannoprotein content enhances the sensations of body and volume in the wine's mouthfeel.

Moreover, by interacting with phenolic compounds in red wines, they reduce the astringency and bitterness produced by the tannic fraction. Together, polysaccharides and tannins increase aroma perception, prolong aftertaste and contribute to wine stability.

	<i>Tanicol</i> <b>REDSense</b>	<b>Manno</b> <b>AROME</b>	<i>Tanicol</i> <b>BLANC</b> <b>EXCELLENCE</b>	<i>Tanicol</i> <b>RED VINTAGE</b>	<i>Tanicol</i> <b>VINTAGE</b>	<i>Tanicol</i> <b>ONE</b>	<b>Manno</b> <b>CROM</b>	<b>Manno</b> <b>BLANC</b>
Grape-seed tannin	✓		✓	✓	✓		✓	
Oak tannin		✓						
Fruity tannin	✓		✓	✓				
Polysaccharides		✓					✓	✓
Aromatic increase	● ● ●	● ●	● ● ●	● ● ●	●			
Color stability	●			●	● ● ●	●	● ●	
Antioxidant protection	●	●	● ●	● ●	● ●	● ● ●	●	● ● ●
Fermentation	● ●	● ● ●	●		● ● ●	● ● ●	● ● ●	● ● ●
Devatting	● ●		●		● ● ●			
Red wines	✓	✓		✓	✓	✓	✓	
White and rosé wines			✓					✓
Fruit increase	● ● ●		● ● ●	● ● ●	●		●	
Volume increase	● ●	● ● ●	● ●	● ●	● ●	●	● ● ●	● ● ●
Micro-oxygenation	● ●	●			● ● ●			
Botrytised grape	●	●	●		● ●	● ● ●		
Low phenolic maturity	● ●	● ● ●		● ●	● ● ●	●	● ● ●	

# Tannins for maceration and devatting

## Tanicol **VINTAGE**

100 grape seed tannin.

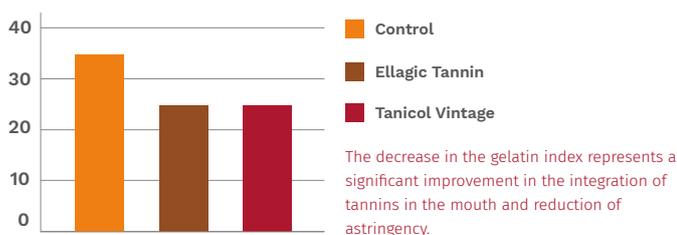
### Condensed grape-seed tannin with great effect on color stability.

It increases the wine's phenolic potential, making it much more robust and enhancing its structure.

It is highly effective when used during fermentation and devatting, increasing the wine's aroma and bringing to the fore its varietal characteristics.

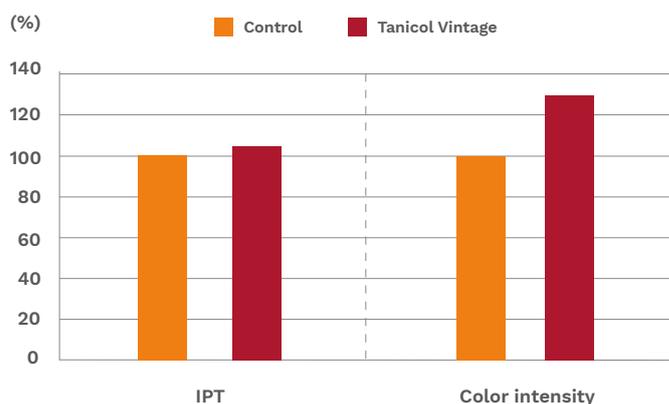
- Improves coloring stability
- Provides body and structure
- Easily dissolved
- Powerful antioxidant

#### Gelatin index



	Control	Tanicol <b>VINTAGE</b>
<b>TPI</b>	42,1	45,2
<b>Color intensity</b>	8,1	10,4
<b>Total tannin content (mg/l)</b>	1439,2	1634,9
<b>Total anthocyanin content mg l</b>	658,9	684,8

#### Addition of 1.7 lb 1000Gal of Tanicol VINTAGE at the start of fermentation



Effect of applying **TANICOL VINTAGE** in production of rosé wine (Tempranillo) at 62.6 °F.

- Increase in color intensity: 29%.
- Increase in TPI: 9.5%.



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DI TORINO

#### Experience conditions: Addition of 28g hl of Tanicol Vintage

	Control	Tanicol <b>VINTAGE</b>	Increase
<b>Total polyphenols Folin Ciocalteu mg l catechin</b>	1265	1438	14%
<b>Color intensity</b>	5,99	8,44	41%
<b>Total anthocyanins mg l malvidin 3 glucoside</b>	278	302	9%
<b>Anthocyanins combined with tannin mg l malvidin 3 glucoside</b>	150	185	23%

Study performed by Università di Torino on the barbera grape variety during the 2018 harvest.

## Tanicol **ONE**

Ellagic tannin chestnut with color protection effect.

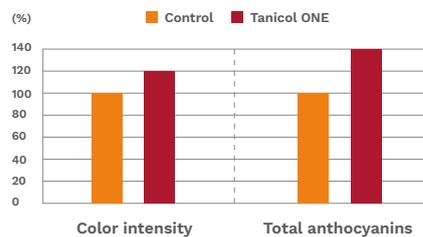
### Antioxidant effect and protector of naturally occurring polyphenols in grapes.

Applied in the initial fermentation stages, it increases the final color of the wine due to its antioxidant protection and co-pigment formation.

Especially suitable for grapes with incomplete maturity as a complement to their structure and for harvests affected by botrytis, due to its antioxidant and antioxidasic capacity.

Ability to react with peptides and proteins to protect the natural polyphenols from grapes.

Experience conditions: Addition of 2.33 lb 1000Gal of Tanicol ONE



Study carried out by the Università di Torino on the Barbera grape variety for the 2018 harvest.

## Manno**CROM**

Enhances structure and stability in red wines.

### Increases the wine's structure and volume. Produces greater color stability.

**Composition:** Mannoprotein-rich product designed to enhance structure and color stability in red wines.

— Contains condensed grape tannin.

## Manno**BLANC**

Adds volume to the mouthfeel and enhances aromatic intensity.

### Increases the wine's structure and volume. Boosts aromatic intensity and stability.

**Composition:** Antioxidat tannin and polysaccharide-rich product designed to maximize aromatic expression in white wines.

# ● Sensory improvement in maceration

## Tanicol **REDSense**

Wine sensory quality improvement in the production of red wines.

### Combination of tannins with effect on color, protection and stabilization in wines.

TANICOL RedSense is a **granulated** tannin that combines tannins from different origins to obtain the desired effects during the vinification of red grapes. An effect on the color, greater wine protection and stabilization, better structure and body as well as an increase in the red and black fruit aromas are obtained as a result of the combination of different types of tannins.

#### Properties

##### Three way antioxidant effect

- Oxygen consumption
- Antioxidasic effect
- Heavy metal precipitation  
(catalysts in chemical oxidation reactions)

##### Enhances wine color intensity

The ellagic tannin favors the copigmentation phenomenon. Formation of stable pigments by blending with the grape tannin.

##### Sensory enhancement

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**Visual** —> Increase of the color intensity and stability

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**Olfactory** —> Red fruit aromas

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**Mouthfeel** —> Structure increase with no astringency

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## Manno **AROME**

Enhances aromatic complexity and structure in red wines.

### Polishes aggressive tannins to enhance the sensations of body and volume in the mouthfeel.

#### Composition

The preparation combines yeast hulls with ellagic tannin derived from selected oak varieties.

- Prevents the appearance of reductive odors.
- Minimizes green notes in underripe grapes.
- Reduces sensations of astringency and greenness.
- Increases volume and structured mouthfeel.

#### Tanicol

#### Manno **AROME**

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<b>Color intensity</b>	5,6	5,5
<b>TPI</b>	51	49
<b>Gelatin index</b>	75	40

---

## Tanicol **RED VINTAGE**

**Accentuated fruit notes.**



**Boosts the tones of red and black fruits, enhancing the varietal typicity of red wines.**

When devatting, clarifies and defines the varietal characteristics. When applied to vintage wines or at pre-bottling, it enhances the descriptors of red and black fruits (cherry, strawberry, plum, blueberry).

### Color Stability

- Increases the content of condensed tannin obtained from grapes favoring a balanced proportion of anthocyanins and tannins.
- Great effect on the color stability due to its high reactivity and capacity of combination with anthocyanins.
- The mixture of condensed tannin and ellagic tannin favors the color stability and a better development over time.
- Increase in the color intensity and in the development potential.

### Structure Increase

- Structure contribution with a soft and sweet sensation.
- Excellent integration with the wine.
- Mellows green and bitter notes coming from a poor phenolic ripeness.
- Accentuates the body and mouthfeel sensations boosting the freshness and respecting the varietal characteristics.

## Tanicol **BLANC EXCELLENCE**

**Creates freshness and aromatic intensity in white wines.**



**Increases complexity and longevity.  
Protects against the evolution of color and aroma.**

Restores the youth of white and rosé wines, providing them with great freshness and higher aromatic intensity.  
Recovers the nuances such as citrus, lemon, grapefruit or nuances of fresh grass and thiol notes, according to the grape variety.  
Increase the wine aromatic profile.

### Antioxidant Effect

- High antioxidant capacity without any sensation of bitterness or harshness, thanks to its high content of grape tannin.
- Removes oxidized and overripe fruit notes, improving the wine development.
- Protects against the development of color and aroma.
- Helps to limit the addition of sulphur dioxide in white wines.
- Reduces or eliminates reductive aromas.

### Structure

- Structure contribution with a soft and sweet sensation.
- Provides the wine with structure in an integrated and balanced way.

# 07. Oak alternatives

The organoleptic benefits of adding oak alternatives to wine can vary based on the botanical source of the wood, fragment size, aging of wood, toasting intensity, and treatment received. Not all wines age in the same way when treated with oak alternatives.

Soil and weather conditions and botanical origin have a decisive influence on wood structure and chemical composition. Winemaking expertise plays an essential role in selecting the best oaks, which determines the quality of the end product.

The SPIRIT range of ageing alternatives is derived from multiple oak sources and is available in several formats and toasts designed to modulate and increase wine complexity.

SPIRIT *Quercus pyrenaica*, a nuance-rich ageing alternative derived from Pyrenean oak, is evidence of AGROVIN's commitment to sustainable management of the Iberian Peninsula's native oak forests.

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**The art of selection**

Application formats

P. 57

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**Oak alternatives**

Spirit products

P. 58

# ● The art of selection

## Selecting the format according to the application

Natural fragments are characterized by their antioxidant properties and capacity to stabilize color in red and rosé wines. These characteristics result from their ellagitan content. They also enhance the wine's structure by increasing the mouthfeel volume sensation, adding sweetness (from the oak's polysaccharides), and help preserve varietal characteristics by absorbing the volatile compounds in wine that produce undesirable aromas.

The transfer times of the different compounds and their integration in the wine depend to a large extent on the format used. The wine-wood contact surface influences not only for the transfer speed but also for the type of compound released and its integration in the wine nuances.

The **"rice grain"** format: this type gives a higher transfer speed of compounds to the wine so it is most appropriate when the contact time is limited to a few days. For this reason it's the recommended format during fermentation.

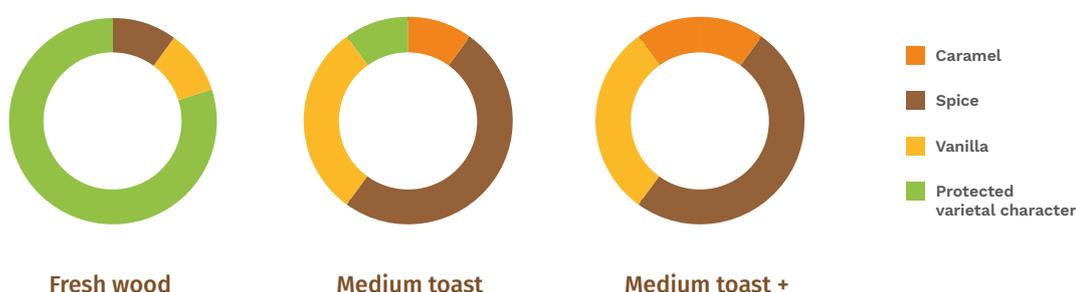
The **"chip"** format: with a slightly larger wine-wood contact surface than for the "rice grain", it is used when the compound transfer to the wine is intended for a relatively short period of time (from a few weeks to a couple of months). The wines obtained in this way tend to have a characteristic profile depending on the botanical or toasted origin. For the appropriate integration of the wood benefits in the wine's nuances, an extra stage after the resting period is recommended. Due to the versatility of this format, it can be used in all the winemaking stages.

The larger formats, **"domino"** and **"staves"** transfer their compounds over longer periods of time, between two and six months. The result is the perfect integration of the wine, resembling to a large extent the wine obtained with barrels. Another large format is the **"zig-zag"**, which is specific for barrels and where the wood can be introduced through the spout to transfer the compounds to barrels which have already been used for several wines.

The **"topping"** format is a new format and has a large wine-wood contact surface which allows for compound transfer from the wood to occur in a short period of time. This format is suitable for fast treatments where a specific wine profile is desired.



### Aromatic profile according to wood toast



# ● The importance of format



## Precision, speed, and integration



### Fine tuning alternatives

Spirit Topping offers the intensity of an alternative, the precision and integration of a tannin, and the volume and sweetness of a polysaccharide.

Topping is the new line of oak alternatives designed to meet today's demands for aromatic precision, transfer speed, and immediate integration. Its innovative format allows treatments shortly before bottling.



#### Olfactory precision

Made from a selection of various species of oak and a controlled, even toasting process, Spirit Topping has a distinctive profile, for wines that require a specific range of aromas.



#### Quick transfer

Due to its compact format, almost the entire wooden surface is available to the wine in a short period of time, allowing for complete treatments in a matter of weeks.



#### Immediate integration

Pretreatment of the wood during the production process creates imperceptible dryness and astringency. Even roasting then maximizes the volume and sweetness.

# ● Oak alternatives



Close resemblance to the varietal character with a blend of vanilla and caramel.

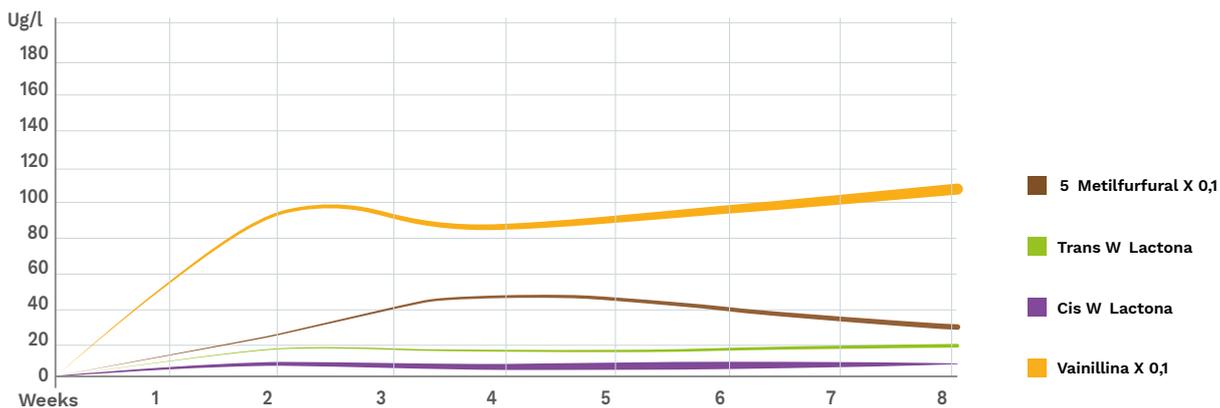
Spirit Candy is a topping with a distinct vanilla profile. Created to intensify a wine's sweetest notes.

Spirit Candy has a high concentration of vanilla and cis-Whisky lactone, which clearly defines the wine profile.

- Adds sweetness at the front of the mouth.
- Subtly contributes fatness and persistence.
- Adds fruitiness at low doses and enhances the perception of ripe fruit.
- Untoasted oak notes increase the aromatic freshness with notes of undergrowth and aromatic herbs.



## Increase in varietal character



Week	5 Metilfurfural X 0,1	Vainillina X 0,1	Trans W Lactona	Guaiacol	4 Metaguaiacol	Eugenol	Isoeugenol
2	26,2 ug/l	<b>98,9 ug/l</b>	17 ug/l	8,3 ug/l	22 ug/l	6 ug/l	1 ug/l
4	49 ug/l	<b>92,6 ug/l</b>	16 ug/l	7,4 ug/l	22 ug/l	6 ug/l	1 ug/l
8	31 ug/l	<b>114,9 ug/l</b>	19 ug/l	8,8 ug/l	24 ug/l	6 ug/l	1 ug/l

## SPIRIT *Nuance*

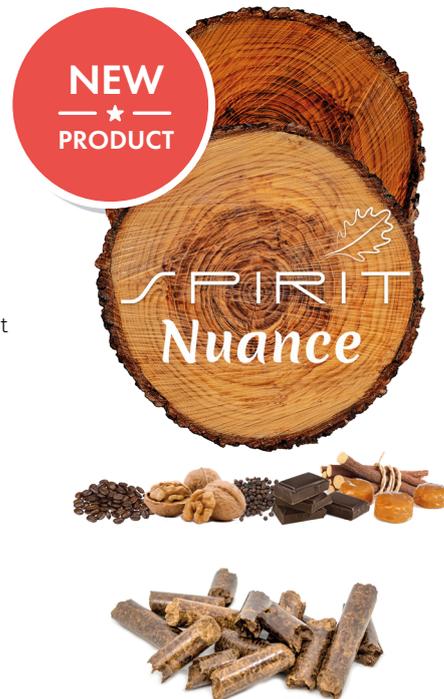
### Adds spicy and subtle roasted aromas.

Spirit Nuance is a subtle topping that enhances overall complexity.

Wide range of spicy and subtle roasted aromas.

Increases all sensations in the mouth. Contributes greatly to persistence by enhancing fruit notes at low doses.

- High aromatic intensity at low doses.
- Amplifies fruitiness.
- Increased sweetness, volume, and fatness.
- Produces longer, more persistent wines.



## SPIRIT *Smoothie*

### Maximum expression of fruit and freshness.

Spirit Smoothie is a unique topping for increasing the fruitiness of wine. Designed to enhance and increase fresh aromas.

Adds fruitiness at low doses. At higher doses, it can add spicy and plant-like notes that create freshness. Some vanilla notes may also appear.

- Designed to support fruitiness. Amplifies fruity aromas.
- Increases unctuousness and middle palate.
- Influences volume and subtly enhances the finish while maintaining acidity.



## Value-added wines

The organoleptic benefits of adding oak fragments to wine vary according to the botanical source of the wood, to fragment size, to toasting intensity and to the treatment received. Not all wines age in the same way when treated with oak fragments. Consequently, it is essential to understand the initial product and to have a clear idea of the goal.

Natural fragments are principally characterized by their antioxidant properties, which help prevent premature browning in white wine. They also help enhance the wine's structure by increasing the sensation of volume in the mouthfeel, add sweetness (thanks to the oak's polysaccharides) and help preserve varietal characteristics by absorbing volatile compounds in wine that produce undesirable aromas.

Toasting reduces the amount of some compounds and produces other new ones (final content varies according to toasting temperature).

The main aromas produced by medium toasting derive from eugenol (clove, pepper and cinnamon) and W-lactone cis- and trans-isomers (coconut and vanilla).

In contrast, intense toasting predominantly produces compounds derived from heat degradation of cellulose and hemicellulose, such as furanic aldehydes (caramel, smoke, toasted and butter aromas).

Intense toasting also produces vanilla aromas, though in this case they derive from vanillin, a low-molecular-mass polyphenol produced by heat degradation of lignin.

## Our recommendation for fermentation



### *Quercus pyrenaica* Iberic oak

#### SPIRIT NATURE

Natural drying for 24 months yields a slow and complex curation, taking us from a green and aggressive wood to a dry and aromatic wood. The Iberian oak is very porous and has a high concentration of ellagitannins so its use in fermentation is perfect for various reasons:

- Fast release of compounds as a result of the rice grain format which is vitally important in fermentation since the contact time is reduced.
- Higher antioxidant protection and color stabilisation. The ellagic tannin provides the antioxidant protection and acts favoring copigmentation in the initial fermentation stages.
- Sweetness and taste quality. The high concentration of lactones in this type of oak tree favors the taste quality and adds sweetness.
- Fruit intensity and aromatic cleanliness from the elimination of sulphur compounds. The ellagic tannin added regulates the redox potential.



### *Quercus alba* (American oak)

#### SPIRIT INTENSE

A medium toast provides intense vanilla aromas as a result of the synergistic action of vanilla and cis W-Lactone, coconut, honey, subtle spices, characteristic toasty and strong oaky flavours.

- During fermentation it provides a light woody flavour increasing the sweetness and the aromatic complexity.





## *Quercus petraea* French oak

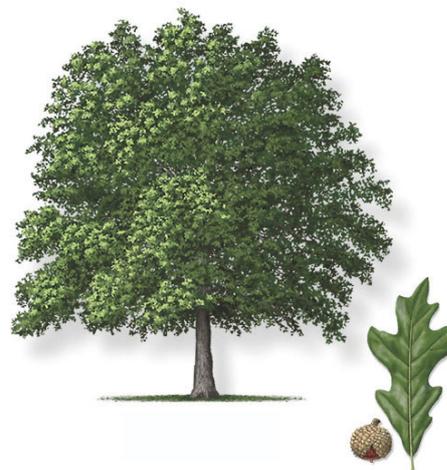
### SPIRIT Classic

When medium-toasted, French oak adds intense aromas of black pepper and clove, liquorice, white coffee, toasted sugar, cinnamon, pinenuts and fine hardwood.



### SPIRIT Special

Increasing toasting intensity produces powerful aromas of dark chocolate, coffee, smoke, liquorice, caramel, pepper, toasted almonds and ripe fruit.



## *Quercus pyrenaica* Iberic oak

### SPIRIT Nature

Natural drying for 24 months slowly but fully transforms the product from aggressively green wood to dry aromatic oak.



### SPIRIT Structure

Medium-toasting increases aromas of vanilla, walnut, coconut, roasting, fine hardwood, molasses and characteristic spices, particularly clove.



### SPIRIT Elegance

Maximizes wines' aromatic complexity with white coffee, smoke, toasted almonds, vanilla, cocoa, molasses, nutmeg and elegant and well integrated wood notes.





## Quercus alba (American Oak)

### SPIRIT Intense

Medium toast, it adds intense vanilla aromas produced by the synergy between vanilla, W-lactone, coconut, honey, subtle spices and well defined characteristic oak notes.



### SPIRIT Forte

Medium-plus toast American oak, it creates intensity and aromatic complexity with mild vanilla, hazelnut, almond, butter, caramel, roasting wood notes.



## Elaboration proposal



The combination of oak alternatives and microoxygenation enables similar objectives to barrel ageing to be achieved in a shorter period of time. The microoxygenation treatment improves the integration of

wood benefits in the wine and yields much more aromatically complex wines in addition to producing wines with a lower tonality and a higher percentage of the wines. In addition, blue component.

### Colour stabilisation



Spirit 13 g l  
DosiOx 20 ml l month

DosiOx 1 ml l month

### Harmonisation stage



DosiOx 5 ml l month

Depending on the oenologist's objective, the time available and the chromatic characteristics of the wine to be treated, doses can vary considerably.

**Ask us!**

# 09. Fining

Limpidity is an essential technical quality that all wineries should ensure before bottling their wine as, in the current market, turbidity and precipitates are viewed negatively by consumers, irrespective of the wine's actual quality.

Consequently, fining is a stage widely included in wine production.

Clarifiers, also known as Fining Agents, are highly specific compounds that remove undesirable elements from wine, including: oxidisable polyphenols, proteins, and other solid compounds. Fining Agents are selected according to the undesirable compounds winemakers need to remove.

When an excessive amount of astringent polyphenolic compounds are detected in wine, adding the Fining Agent high-molecular-weight proteins (long-chain gelatines or egg albumin) is recommended.

These agents react quickly with the undesired compounds, creating a softening effect to the finished wine with their removal.

If wine suffers from pronounced protein instability, inorganic compounds should be added (i.e. bentonite or silica sol) to draw off the excess proteins and achieve the desired stability.

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#### Selective fining agents

BCP XXI	P. 69
Triplex R	P. 69
Divergan	P. 69

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#### Vegetable fining agents

Proveget Bc	P. 69
Proveget Cristal	P. 69
Proveget Clar	P. 69
Proveget Fine	P. 69
Proveget 100	P. 69
Proveget Quit	P. 70
Proveget Premium	P. 71

## Vegetable protein fining agents

Product	Composition	Application
<b>Proveget PREMIUM</b>	Pure vegetable protein with great reactivity	Great clarity of clarified white wines. Elimination of oxidized and potentially oxidizable polyphenols. Obtaining fresher wines in aromas.
<b>Proveget BC</b>	Vegetable protein and combination of activated calcium bentonites and natural sodium bentonites	Clarifies potentially oxidizable must. Reduction of the protein content of musts. Improves yield, good compaction of the lees.
<b>Proveget CRISTAL</b>	Vegetable protein, PVPP, Bentonite and Cellulose	Must fining during fermentation. Elimination of inhibitory elements of fermentation. Improved fermentation kinetics.
<b>Proveget QUIT</b>	Vegetable protein, Chitin-Glucan and Bentonite	Substantial improvement in the clarity and protein stability of wines. Metal content reduction. Improvement of the evolution of wines.
<b>Proveget CLAR</b>	Vegetable protein, PVPP and Bentonite	Specially indicated for white and rosé wines. Removes turbidity, proteins and browning.
<b>Proveget FINE</b>	Pure vegetable protein ( <i>Solanum Tuberosum</i> )	High selectivity. Clarification of high-end wines. Removes oxidized or oxidizable polyphenols.
<b>Proveget 100</b>	Pure vegetable protein ( <i>Pisum Sativum</i> )	Fines musts during clarification or alcoholic fermentation.

## Selective fining agents

Product	Composition	Application
<b>BCPXXI</b>	Bentonite, PVPP and Cellulose	Removes proteins and oxidized or oxidizable polyphenols.
<b>TRIPLEX R</b>	Bentonitae, PVPP and Carbon	Creates sharply defined, long-lasting color. Removes reductive and other.
<b>PVVIN*</b>	European PVPP	Removes catechins and leucoanthocyanins, preventing development of oxidized tones.

\* PVVIN is a registered trademark that does not belong to AGROVIN.

# ● Vegetable-protein fining agents

## Vegetable protein **Proveget**

At AGROVIN, we believe that technological innovation is the engine driving the wine sector's ongoing development. Developing new fining agents allows winemakers to obtain outstanding results in shorter time scales whilst preserving the wine's personality.

Vegetable-protein fining agents meet demand from new markets (e.g. consumers of vegetarian and kosher wines) that refuse to consume animal by-products.

**Proveget** fining agents produce rapid flocculation and compact lees.

They protect the wine's organoleptic properties against oxidation and polish aggressive tannins.

### In white wines

- They improve antioxidant capacity and significantly decrease absorbance at 420 nm and 440 nm.
- They improve color by removing browning.
- There is no significant loss of intensity in the nose.
- They do not increase protein instability.

### In red wines

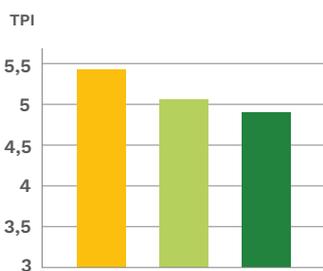
- They polish astringency, smoothening the mouthfeel.
- There is no significant loss of color intensity.
- There is no significant loss of intensity in the nose and they have a slight antioxidant effect.

## Proveget **QUIT**

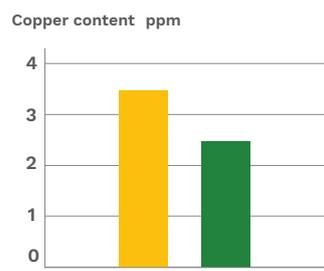
Clean and intensely aromatic wines.

## A natural solution for removing oxidizable polyphenols.

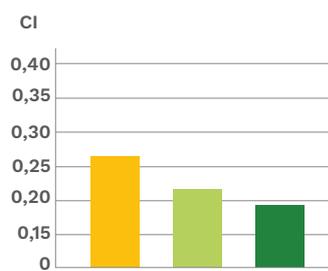
### Decreased TPI



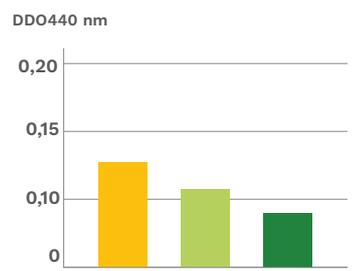
### Lower levels of copper



### Decreased color intensity



### Less browning



Control Proveget QUIT 50g hl Proveget QUIT 100g hl

— Adding a 4 lb/1000Gal dose of Proveget QUIT during fermentation produced a significant decrease (20%) in both color intensity and browning in the sample.

# Proveget PREMIUM

Highly reactive plant based clarifier.

## Vegetable protein (*Pisum sativum*) in liquid format.

Due to a more environmentally friendly production process without drastic temperature changes, an extraction process is obtained that releases the protein from plant structures, allowing for a greater active fraction of soluble plant protein.

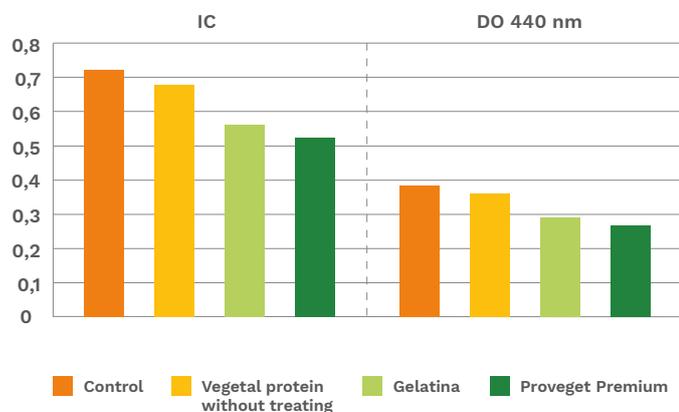
This treatment process alters the protein conformation, thereby achieving greater reactivity.

**Proveget Premium** is the result of the Winebalance project:  
“Improving the colloidal structure of wine: New relevant bioactive tools”

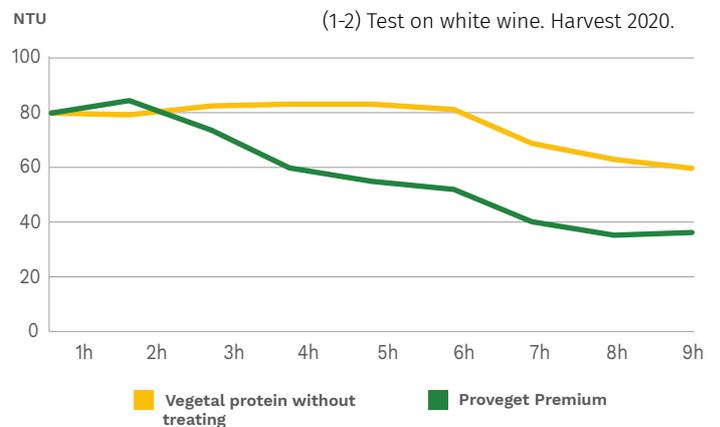


UNIÓN EUROPEA  
Fondo Europeo de Desarrollo Regional (FEDER)  
Una manera de hacer Europa

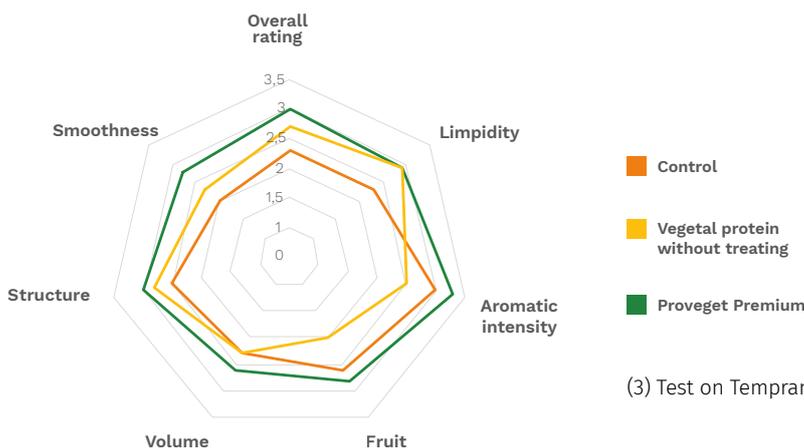
### 1. Impact on color



### 2. Sedimentation rate



### 3. Greater respect for wine



# ● Oxygen management

## DosiOx

### Extremely accurate oxygen dosing equipment.

- Easy to operate, with full digital control of all parameters and provided with two microprocessors.
- Windows programming environment accessed via a full-color touch screen.
- Individual programming of macro-oxygenation, micro-oxygenation and cliqueur treatment.
- Dosage determined according to oxygen mass (mg of O).
- Non-volatile memory. In the event of electrical failure, the equipment will either continue the process from the point of failure (if predefined by the user) or await further instructions.
- Double independent protection of the main microprocessor. Electrical or mechanical failures are detected by an auxiliary microprocessor, which immobilizes the apparatus and displays the corresponding fault on screen, preventing dosing errors.
- On-screen display showing remaining oxygen to be added, flow rate necessary to keep dosing constant, dosing time remaining, cycle status and status of the variables programmed for the output displayed.

### The number of dosing outputs varies according to the DosiOx model

#### DosiOx® pupitre

4 - 64 dosing outputs.

#### DosiOx® QX2

2 dosing outputs.



### During alcoholic fermentation

#### 1. Macro oxygenation

Favours formation of yeast sterols during fermentation.

**Dosage:** 4 ml/l over 6 h.

**When added:** density = 1060.

#### 2. Macro oxygenation

Polymerization of free anthocyanins and tannins.

**Dosage:** 3 ml/l over 8 h.

**When added:**

density = 1040.

#### 3. Macro oxygenation

Polymerization of free anthocyanins and tannins.

**Dosage:** 2 ml/l over 12 h.

**When added:**

density = 1020.

### After alcoholic fermentation

#### 1. Micro oxygenation

Color stability and tannin polymerization.

**Dosage:** 20 ml/l/month.

**When added:** Between end of alcoholic fermentation and start of malolactic fermentation.

#### 2. Micro oxygenation

Stabilization of color and production of clean aromas.

**Dosage:** 5 ml/l/month.

**When added:**

After malolactic fermentation

#### DosiOx® SX1

4, 8 & 16 dosing outputs.

# ELECTROWINE

## DosiOx



## *Redox potential, wine in 3D*

**ElectroWine** system monitors the Redox potential in tanks to discover the trend of wine towards reduction or oxidation:

# 01

**Monitor the development of yeast populations** during fermentation alcoholic, causing a lowering of potential electrochemical.

# 02

**Optimize SO<sub>2</sub> management** knowing if the wine is at risk of oxidation or reduction.

# 03

**Management of micro-oxygenation** based on analytical parameters, which allow greater **control of the process**.

## Ordering information

### Placing orders

You can place your order by email.

Email to: [heather.nenow@agrovin.com](mailto:heather.nenow@agrovin.com)

Orders are normally shipped within 24-48 hours of receipt.

### Terms of sale

Terms for payment are Net 30 days for established accounts. Past due invoices may be subject to a late fee of 2% per month on the unpaid balance.

A Customer Information/Credit Application must be completed and approved by **Agrovin USA inc** in order for credit to be established.

### Shipping

Orders are sent via UPS or FedEx.

Large shipments are delivery by common carrier.

### Payments

Payment check, money order, Wire transfer.

We accept Mastercard, American Express and Visa.

### Prices & Bids

For a price quote on large harvest orders or full trucks like Tartaric, Cream of Tartar... contact by email to [jason.rodriguez@agrovin.com](mailto:jason.rodriguez@agrovin.com)  
Order early to ensure product availability.

If you require confirmed prices for your order, please contact our sales department by email at: [irabada@agrovin.com](mailto:irabada@agrovin.com).

### Return Policy

We offer credit if products are returned unopened/undamaged within 10 working days of delivery. Returns are subject to a 15% restocking charge.

Please contact [ordersUSA@agrovin.com](mailto:ordersUSA@agrovin.com) authorization prior to return.

Winemaking products that require refrigeration or freezing cannot be returned.

Customer will pay return freight costs.

### Damage claims

Damage Claims must be reported within 3 working days of delivery.

Supplemental technical information is available online at [www.agrovin.com](http://www.agrovin.com)

### Return Policy

Dosage rates are infinitely variable: harvest, grape variety, type of wines and specific application, wine temperature etc... It is the buyer's responsibility of the buyer to adapt the use of our products to such variables.

The information in this catalog is provided "as is", without warranty or guarantee of any kind.

It is important to us that the information in this catalog is as accurate as possible. We apologize for any technical inaccuracies or typographical errors.

## Calculations and conversions charts

### Temperature conversions

°F	0	32	40	50	60	70	80	90
°C	-18	0	4	10	16	21	27	32
°F = (°C x9/5)+32								

### Acids

	Tartaric acid	Sulfuric acid	Malic acid	Lactic acid
Tartaric acid	1	0.653	0.893	1,2
Sulfuric acid	1.531	1	1.367	1.837
Malic acid	1.119	0.731	1	1.343
Lactic acid	0.833	0.544	0.744	1

### Equivalent Units

1 gal = 3,785 L	1 L = 0,264 gal
1 ml = 0,035 fl oz	1 fl oz = 30 ml
1 gal = 0,379 hl	1 hL = 26,4 gal
1 metric ton =2205 lb	1 metric to = 1000kg
1 US ton = 2000 lb	1 US ton = 907 kg
1 lbs = 453,6 g	
1ppm = 1 mg/l	
1º Brix = 1% sugar (wt/vol)	
1 Vol % = 1 ml/ 100 ml	
1 barrel = 225 L = 59,4 gal = 25 cases of	

### Dosage

g/hl	lbs/10³gal	ppm
5	0.4	50
10	0.8	100
15	1.2	150
20	1.6	200
100	8	1000

# ULISES TDR<sup>2</sup>



## *Comprehensive management of fermentation*

The new **ULISES TDR<sup>2</sup>** is a system that converts any traditional deposit in an automatic winemaker, through:

### 01

**Smart management** of multiple deposits in real time, customizable and expandable to measure.

### 02

Includes **comebacks** system, measure the tank level and macro / micro-oxygenation.

### 03

Monitoring, control and evaluation of temperature, density and **Redox potential**.

572 Martin Avenue  
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Rohnert Park, CA 94928

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agrovinausa@agrovin.com

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[agrovin.com/en](http://agrovin.com/en)

