

# Harvest Catalog Vol. III

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

## viniferm **ÉLITE** 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.

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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.

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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.

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## viniferm **Direct**

### Yeasts easily applicable to wines with a varietal profile

Yeast specifically selected for its easy application in the winery with a great capacity to adapt to the limiting conditions of the must.

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## viniferm **NS TD**

### No-*Saccharomyces* Yeast. Increased aromatics and mouthfeel

Viniferm NS TD is a strain of *Torulaspora delbrueckii* selected for its ability to improve sensory qualities in wines.

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## viniferm **ÉLITE**

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### **Unroasted Iberian oak in "grain of rice" format**

Enhances the floral and varietal aromas of the wine. Its high antioxidant capacity respects the fruit and participates in colour stabilisation.

**P. 60**



### **Increased freshness and sensation of acidity**

Specific product for white and rosé wines with medium-long toasting at low temperatures with the aim of enhancing aromatic freshness and freshness in the mouth.

**P. 61**

## **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.

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# 01. Microbiological control and antioxidant protection

The control of the growth and development of contaminant microorganisms is essential for obtaining a high-quality product according to food safety demands.

Currently, the use of sulphur is firmly established in wineries. Its advantages, such as control of bacterial flora, destruction of oxidase enzymes such as laccase and tyrosinase, and its antioxidant effects make it a key element in wine production. However, its application can lead to harmful technological effects, such as:

- Its addition destroys Thiamin and Vitamin B1.
- Chemical production of hydrogen sulphide at redox potentials below -70mV.
- Inhibition of malolactic fermentation
- Discoloration of anthocyanins.
- At high doses, it can provide a pungent odor and unpleasant taste.

But today, the most noted problems with the use of sulphur are related to its toxicity and, therefore, its negative effect on health.

For this reason, consumption of ecological and organic wines have grown over the last decade.

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**Improves the microbiological stability of musts before the FA**

Microstab pH P. 10

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**Alternative to SO<sub>2</sub> with antimicrobial effect**

Microstab Protect P. 11

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**Microbiological stability in wine**

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Microstab ML P. 12

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

SuperBouquet Evolution P. 13

Table of antioxidant and microbial products

	MICRSTAB pH	MICRSTAB PROTECT	MICRSTAB ML	SuperBouquet EVOLUTION
Antimicrobial capacity	● ● ●	● ● ●	● ● ●	
Antioxidant capacity		● ●		● ● ●
Organoleptic effect	Acidity and freshness	Neutral	Freshness and acidity	Increased volume
Fungal chitosan	✓	✓	✓	
Yeast enriched in glutathione		✓		✓
Must	✓	✓		✓
Wine	✓	✓	✓	✓
Format	Liquid	Solid	Solid	Solid
Solid	✓	✓		✓



Dose: 50-200 ml/hl | Package: 24 and 1200 kg

## 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:

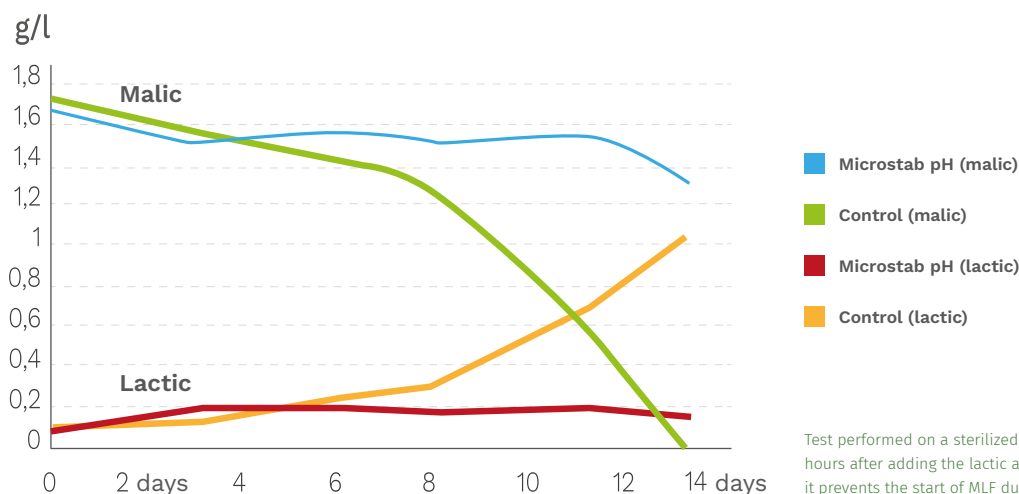
- To prevent bacterial contamination with a dosage of 1.9 - 3.8 L/1000 Gal.
- As a tool to control malolactic fermentation with a dosage of 5.7 - 7.6 L/1000 Gal.
- Combined with SuperBouquet Evolution to efficiently reduce the addition of sulphites to wine

### 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.



Dose: 10-30 g/hl | Package: 1 kg

**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 catalysts. 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







Dose: 30-60 g/hl | Package: 1 and 15 kg

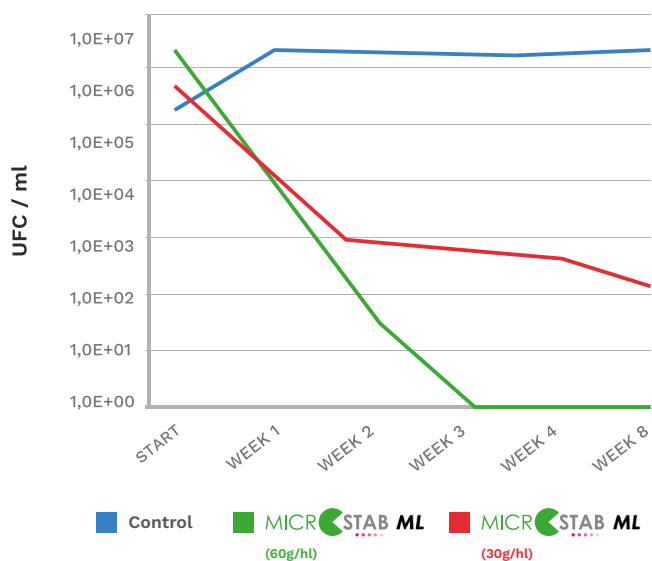
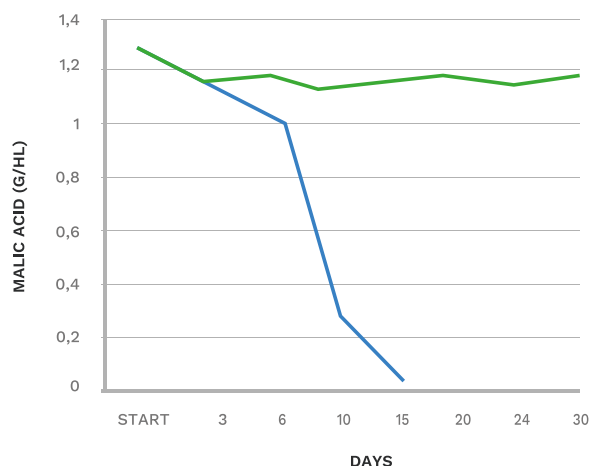
**Biological stabiliser with high effectiveness against lactic acid bacteria.**

**It allows malolactic fermentation to be inhibited for long periods of time and reduces *Brettanomyces* populations, reducing the risk of alterations due to the presence of this contaminating yeast.**

### Application

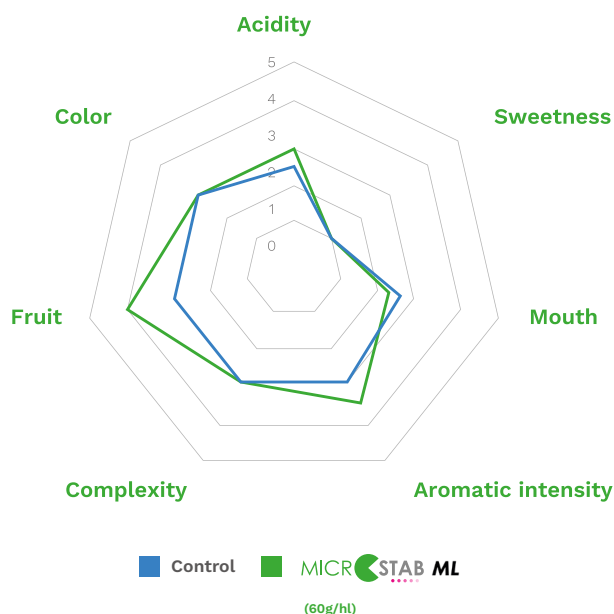
In white and red wines

- Controls Malolactic Fermentation. Delays and even inhibits malolactic fermentation. Maintains the acidity and the initial pH of the wines and reduces the formation of biogenic amines.
- Improves microbiological stability. Substantially reduces the population of lactic bacteria and helps control the *Brettanomyces* population.
- Reduces the SO<sub>2</sub> dose, thanks to the improved microbiological stability, helping to reduce the dose of sulphur applied during wine conservation.



Comparison of the evolution of the lactic bacteria population over time after treatment with different doses of Microstab ML

Stop FML with the application of Microstab ML (60g / hl)



Organoleptic profile comparing control wine with wine after treatment with Microstab ML (60g/hl). Tempranillo wine, year 2021

# SuperBouquet EVOLUTION

Dose: 20-40 g/hl | Package: 1 and 10 kg

**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.

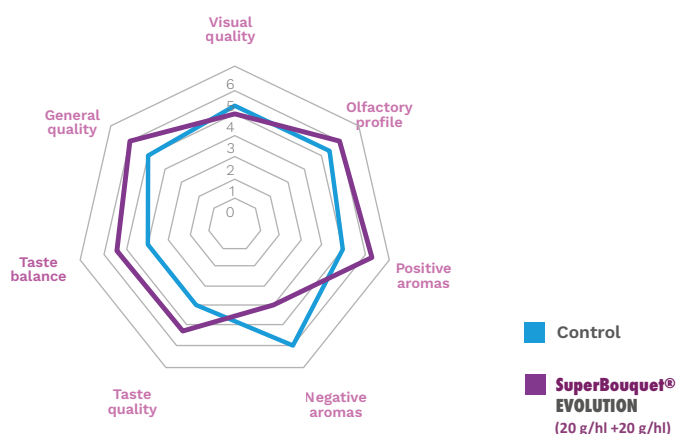
For wines with low SO<sub>2</sub> levels or without sulphites, we recommend managing dissolved oxygen and regularly checking the microbiology.

## 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**

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**Combined and inorganic nutrients**

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## 100% organic nutrients

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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>XL</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  $H_2S$ , 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:

Potential alcoholic	Suggested YAN (ppm)		
	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



# Actimax NATURA

Dose: 20-30 g/hl | Package: 1 and 10 kg

**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).

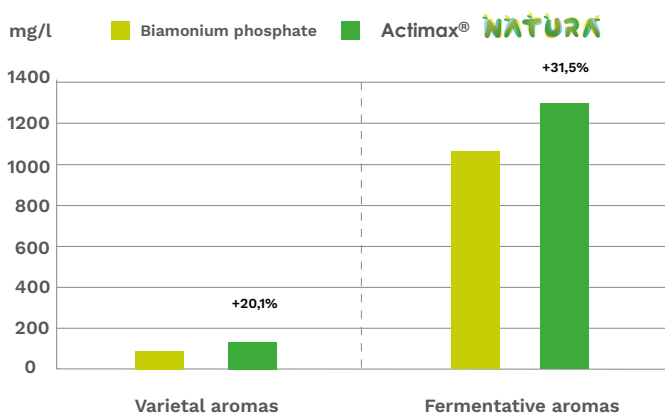
This alcoholic fermentation nutrient is a result of the research carried out as part of the CENIT-DEMETER (2008-2011) Project: "Winemaking and oenological strategies and methods against climate change. The application of new technologies that improve the efficiency of the resulting processes", within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



### Sensory effect of organic nutrition.

- **Increase in varietal aromas:** The amino acids accentuate the aromatic complexity, increasing the varietal notes. Good nitrogenous nutrition results in the optimal performance of the enzymes (proteins) responsible for the release of aromatic precursors present in the grape:  $\beta$ -glycosidases and  $\beta$ -lyases.
- **Formation of fermentative aromas:** Amino acids are the basis of volatile compounds produced by yeasts. One third of the higher alcohols are produced during the start of alcoholic fermentation from amino acids. Subsequently, and in the presence of ethanol, they form fruity esters with a very positive influence on the wine.
- **Prevents reduction aromas.**

### Aroma enhancement



Compound	DAP	Actimax Natura
Linalol	6 µg/l	6.8 µg/l
B-Citronelol	1.4 µg/l	3.1 µg/l
Linalool acetate	2 µg/l	3.6 µg/l
Ethyl butyrate	0.39 µg/l	0.43 µg/l
Isoamyl alcohol	132 µg/l	146 µg/l
Ethyl decanoate	0.50 µg/l	0.55 µg/l

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.

# Actimax **VARIETAL**

Dose: 20-40 g/hl | Package: 1 kg

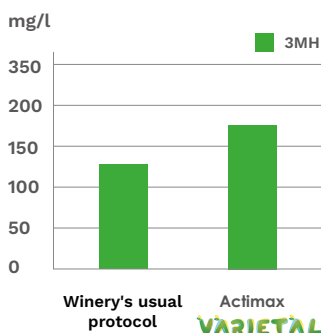
**Organic activator for alcoholic fermentation.**

## 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.

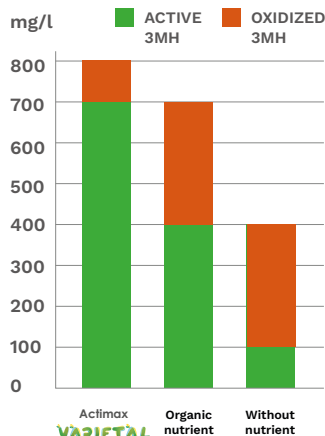
These thiols are found in grapes in their non-odorant form (thiol precursors) and only a few yeasts (with a high  $\beta$ -lyase enzyme activity, such as VINIFERM REVELACIÓN) enable their release expressing all the varietal potential with a thiol character. This family of compounds is especially sensitive 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

Dose: 10-20 g/hl | Package: 1 kg

## 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.

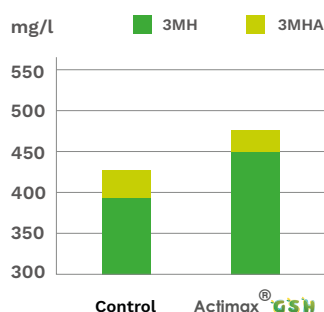
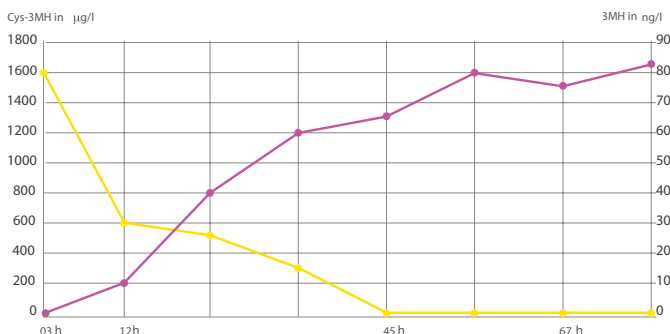
## Production and protection of thiols

### 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 NH<sub>4</sub> 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® *Plus*

Dose: 10-20 g/hl | Package: 1 and 20 kg

## 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*

Dose: 20-30 g/hl | Package: 1 and 10 kg

**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  $Mg^{2+}$ ,  $Zn^{2+}$  y  $Ca^{2+}$  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.

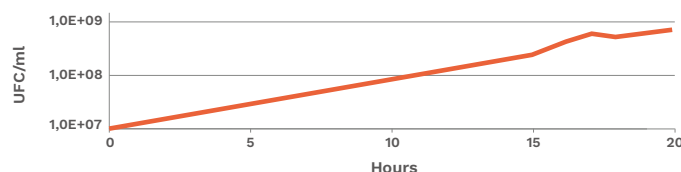
## Thiamine

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

The use of agents for converting must into wine, yeasts, exalt the varietal, aromatic or even regional particularities of varieties and types of production, while minimising risks during fermentation.

AGROVIN puts at your disposal a wide variety of strains (Viniferm yeasts) chosen for their fermentative abilities and characteristics, adapting to all styles of wine to be made, with respect to the aromatic and taste profile, working temperatures, nitrogen needs, influence on colour and alcoholic yield, among others.

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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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## Aromatic yeast for red wines

Viniferm Carácter	P. 34
Viniferm RVA	P. 34
Viniferm Sensación	P. 35
Viniferm TTA	P. 35
Viniferm Élite	P. 36
Viniferm 3D	P. 37
Viniferm CT007	P. 37
Viniferm DIRECT	P. 38

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## Non-Saccharomyces Yeasts

Viniferm NSTD	P. 39
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## Viniferm Yeasts

AGROVIN is supporting a selection of autochthonous yeasts adapted to the winemaking processes of our latitudes.

Yeasts viniferm®	Tolerance to ethanol (Vol.)	Working temperature (°C)	Nutritional needs	Alcoholic yield	Phenotype Killer	Fructophilous strain	Suitable for resolving	Aromatic profile varietal	Fermentative Profile	Increased structure	Type of wine
<b>REVELACIÓN</b>	14 %	13-25	High	Medium	Killer	-	-	yes	-	-	● ●
<b>DIANA</b>	14 %	14-25	High	Medium	Killer	-	-	yes	yes	-	● ●
<b>Elegance</b>	15 %	12-25	Low	Average	Killer	yes	-	yes	-	yes	● ● ●
<b>AURA</b>	16 %	12-30	Average	High	Killer	-	-	-	yes	-	● ●
<b>PASIÓN</b>	14 %	14-25	Average	Average	Killer	-	-	-	yes	-	● ●
<b>EMOCIÓN</b>	14.5 %	13-28	Low	Average	Killer	-	-	-	yes	-	● ●
<b>Sensación</b>	14 %	15-28	High	High	Neutral	-	-	-	yes	yes	● ● ●
<b>ÉLITE</b>	16 %	18-26	Average	Average	Killer	-	-	yes	-	yes	● ●
<b>RVA</b>	16 %	16-28	High	Low	Killer	-	-	yes	-	-	●
<b>TTA</b>	14 %	18-28	Average	Average	Neutral	-	-	-	yes	-	● ●
<b>Carácter</b>	15 %	16-28	High	Low	Killer	-	-	yes	-	yes	● ●
<b>CT007</b>	15 %	14-30	Average	High	Killer	yes	-	yes	-	-	●
<b>3D</b>	15 %	18-28	High	Average	Neutral	-	-	yes	-	yes	● ●
<b>911</b>	14 %	14-25	Low	Average	Killer	yes	-	yes	-	yes	● ● ●
<b>PDM</b>	16 %	12-25	Low	High	Killer	yes	yes	Neutral	Neutral	-	● ● ● ●
<b>BY</b>	17 %	10-25	Low	High	Neutral	yes	yes	Neutral	Neutral	-	● ● ● ●
<b>KLR</b>	16 %	12-30	Low	High	Killer	yes	yes	-	-	-	●
<b>522</b>	14 %	18-30	Average	High	Neutral	-	-	Neutral	Neutral	-	● ●
<b>Start</b>	17 %	14-30	Average	Low	Neutral	yes	yes	Neutral	Neutral	-	● ● ● ●
<b>DIRECT</b>	15 %	16-28	Average	High	Neutral	-	-	yes	-	yes	●

● Red ● White ● Rosé ● Sparkling



# ● Selection of VINIFERM yeasts

## The difference is in the variety

The predominance of *Saccharomyces* species and their particular relevance to the success of the winemaking process has led to the development of starter culture technology around these species. Natural selection involves searching for yeasts directly in the grapes and vineyards, as well as in spontaneous fermentations.

After isolation, an oenological characterisation process is necessary to ensure its positive contribution to the winery. The selection criteria for the isolated strains can be divided into three blocks: fermentative properties, technological properties and sensory properties.

Some of the advantages of these types of yeasts include:

- **Fast and safe fermentation.**
- **Improved sensory qualities.**
- **Respect for typicality.**
- **Aromatic complexity.**
- **Varietal expression.**

viniferm **Years of research**

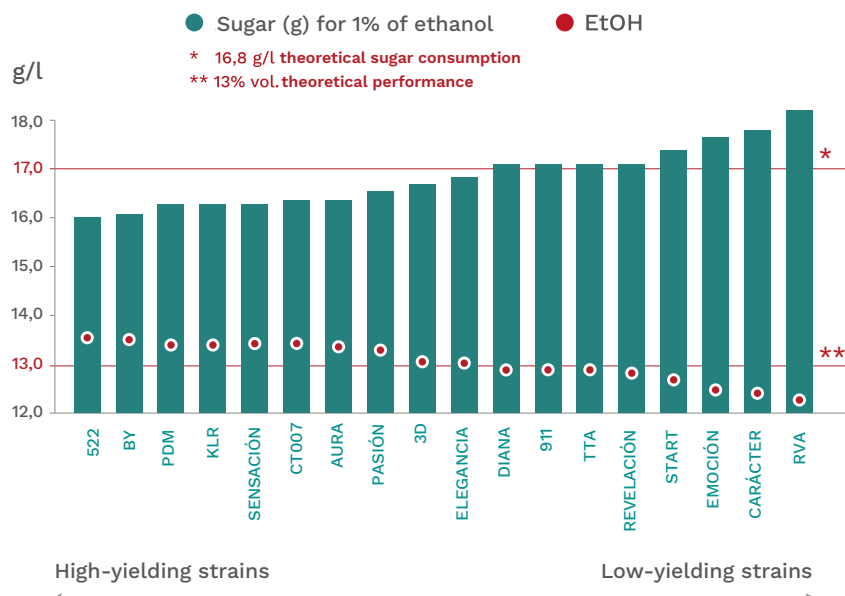
In recent years, AGROVIN has focused on the selection of autochthonous yeasts adapted to the winemaking processes of our latitudes and their oenological characterisation according to the updated manufacturing criteria. To do so, the company has started Research Projects with various centers of recognised world prestige in

the field of Oenological Microbiology: Polytechnic University of Madrid (UPM); Higher Council for Scientific Research (CSIC), Complutense University of Madrid (UCM), Rovira i Virgili University (RiV), Valladolid University (UVa) and the University of Valencia (UVEG).

## Alcoholic yield of the strains

In wines from regions subjected to the rigors of climate change, or vintages seeking phenolic maturity, knowing the alcoholic yield of the yeast strain to be used makes it possible to modulate the final alcoholic strength of the wine.

There are substantial differences between the yeast strains.



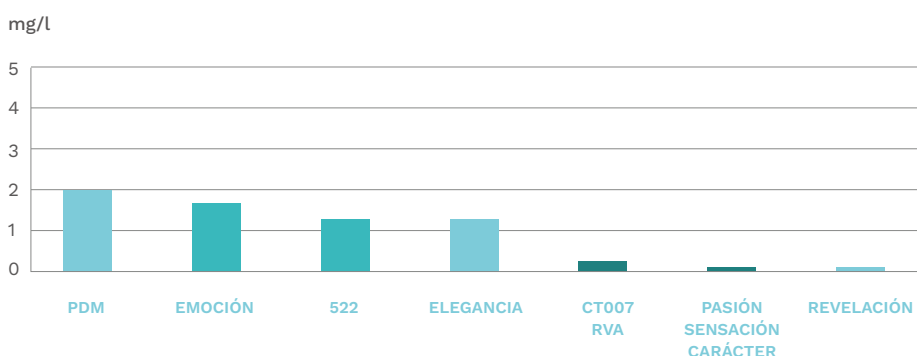
## Sulphur dioxide in wine

The unfavorable effects of sulphur dioxide on consumer health and the legislative control of its use below certain limits make it desirable to reduce its use in wines.

In any case, these alternatives must be accompanied by manufacturing practices that reduce the need for antimicrobial and antioxidant agents: avoid excessive contamination, selection and use of yeast

strains with low SO<sub>2</sub> production, corrections with nutrients without ammonium sulphate, reasoned use of thiamine, pH control, protection of the natural antioxidant power of grapes and yeasts (glutathione) or vinification under reducing conditions, among others.

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



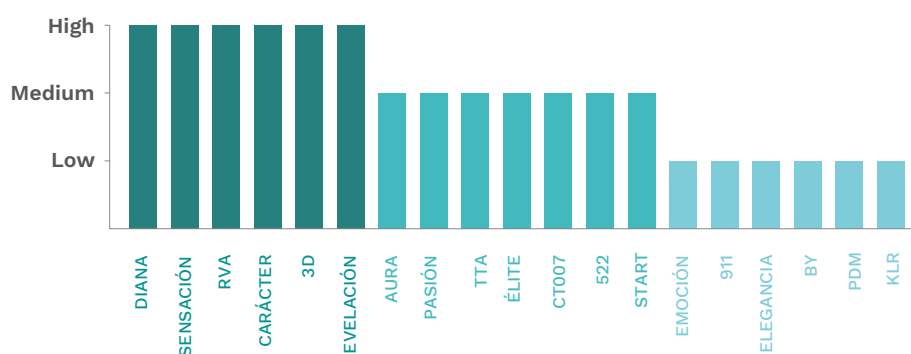
Low sulphur production is a selection criterion for Viniferm yeasts.

The strains REVELACIÓN, CARÁCTER, SENSACIÓN, PASIÓN, CT007, RVA, ELEGANCIA and EMOCIÓN produce less than 2 mg/l of SO<sub>2</sub> during the wine-making process.

## Nitrogen needs of the yeasts

For optimal development of alcoholic fermentation and maximum expression of the grape's abilities, it is necessary to learn the nutritional requirements for each strain. All yeasts do not have the same nitrogen resource demands. The more sophisticated a strain (production of fermentative aromas, release of varietal precursors, production and release of polysaccharides), the more requirements it will have.

In the same way, when the fermentative conditions become difficult (fermentations at low temperatures, clarification, low pH) the yeasts will increase their needs. Of course, the potential alcoholic degree of the grape or must, which determines the number of yeast generations, implies different requirements. Between 12° and 14° of probable alcohol, the nitrogen needs increase by 20%.



**Nitrogen needs of the Viniferm family of yeasts**

# ● Varietal yeasts for white wines

## Varietal character

### Release of thiols

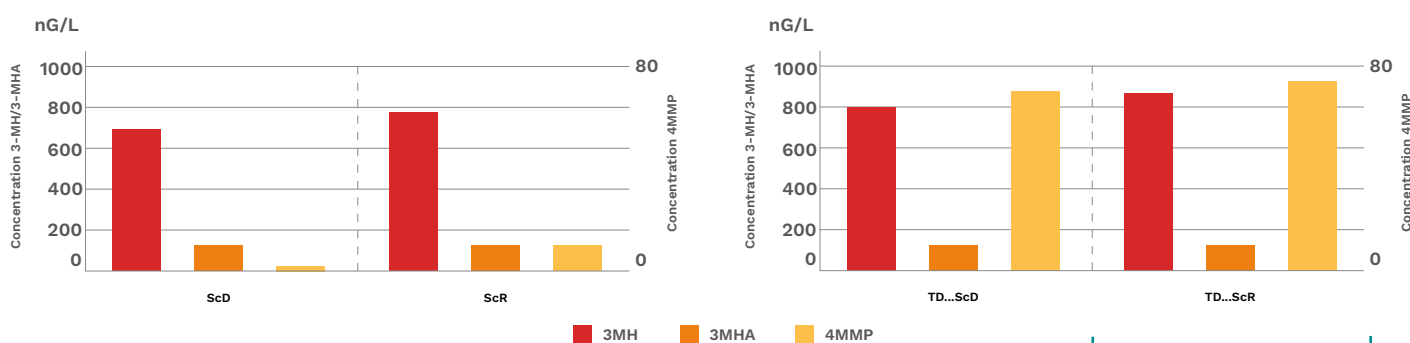
The release of thiol precursors takes place between the third and fifth day of alcoholic fermentation. It strictly depends on the fermentation temperature (20°C >13°C) (see graph: “impact of the different thermal profiles on the aroma of the wine”).

To achieve the best results, excessive clarification should be avoided.

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

The combination of thiol *Saccharomyces* in mixed culture with the ***Torulaspora delbrueckii*** strain NSTD, implies an overall increase in the characteristic thiol descriptors.

### Great release of 4-MMP in sequential inoculation with VINIFERM NS-TD + VINIFERM REVELACIÓN



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

## Impact of the different thermal profiles on wine aroma.

Wines developed at a **thermal profile of 14°C** are the richest in fermentative esters, and the poorest in varietal thiols.

The **thermal profile at 18°C** makes it possible to obtain wines with the greatest potential in varietal thiols, while also producing the least fermentative esters.

Wines with an **inverted thermal profile (18+14 °C)** are those with an intermediate aromatic profile, with a concentration of varietal thiols (Ac3MH) and interesting fermentative esters. They are the most complex.

	14° C	18° C	18+14° C
Varietal thiols 4MMP, 3MH	●	● ● ●	●
Ac3MH	●	● ●	● ● ●
Fermentative Esters	● ●	●	● ●

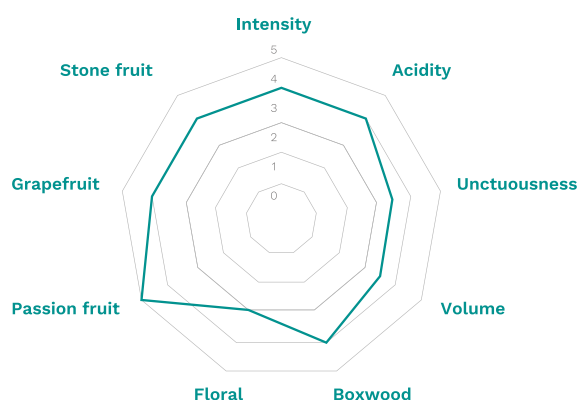
## viniform REVELACIÓN

Dose: 20-30 g/hl | Package: 500 g

**Plenitud aromática. Varietal thiol profile.**

### Maximum thiol expression

- Development of whites and rosés with highly elegant and complex varietal character.
- Suitable for fermentations with inverted thermal profiles.
- $\beta$ -Liasa activity. Release of thiols, capable of converting thiol-type precursors into perceptible aromas, in particular: 4MMP: (boxwood, cassis), 3MH: (grapefruit, citrus) and 3 MHA: (passion fruit, mango, pineapple).
- **Wine profile:** Floral aromas, persistence and good evolution over time, longer-lived wines.



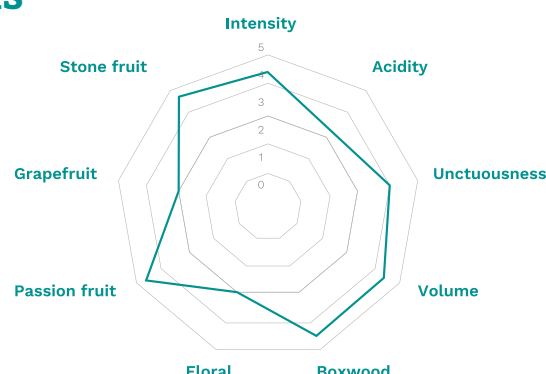
## viniform DIANA

Dose: 20-30 g/hl | Package: 500 kg

**Varietal and/or barrel-fermented white wines.**

### Production of thiol and fermentative aromas

- Development of high-quality varietal whites and rosés (Verdejo, Sauvignon Blanc, Albariño...).
- Development of white wines under reducing conditions. Releases 4MMP and 3MH.
- $\beta$ -Liasa activity.
- **Wine profile:** Fermentative, fruity aromas. Wines with volume and structure. Respect for varietal characters, extolling tropical fruit aromas (mango, passion fruit) and stone fruits (apricot). Unctuousness and volume in the mouth.



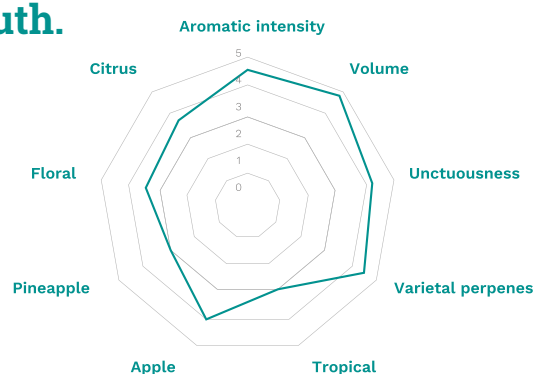
## viniform ELEGANCIA

Dose: 20-30 g/hl | Package: 500 g

**Primary clean and floral aromas, release of terpenes.**

### Preserves the varietal character and accentuates the sensations of volume and smoothness in the mouth.

- Especially indicated for the development of varietal white wines.
- Cryophilic yeast with  $\beta$ -glucosidase activity. Interesting for low-temperature fermentations.
- Primary and floral aromas.
- **Wine profile:** preserves the varietal character and accentuates the sensations of volume and unctuousness in the mouth.



# ● Aromatic yeasts for white wines

*Saccharomyces cerevisiae* thanks to its metabolism, can produce higher alcohols from a source of amino acids and sugars. Through esterases, yeast can combine these alcohols, forming esters that have a very positive influence on the aromatic profile of the wine. The compounds generated during fermentation that affect the aroma of the wines include:

- **Higher alcohols:** Amino acids are deaminated to form  $\alpha$ -keto acids, which are decarboxylated to aldehydes and finally reduced to generate alcohols (isoamyl alcohol, 2-phenylethanol).
- **Alcohol esters:** result of the reaction of acetyl-CoA with higher alcohols (isoamyl acetate, hexyl acetate).
- **Fatty acid ethyl esters:** obtained by ethanolysis from acyl-CoA that is formed during the synthesis or degradation of fatty acids (ethyl butanoate, ethyl hexanoate, ethyl octanoate).

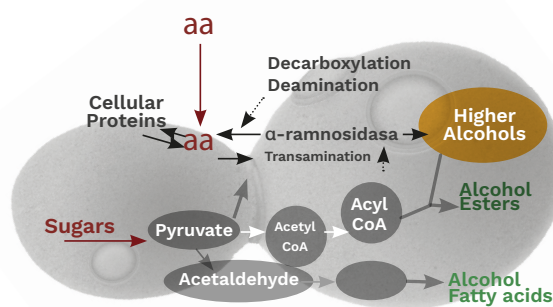
## Amino acids: aroma precursors

Although each aroma comes from a certain amino acid, there is no direct synthesis from the incorporation of each one, but they are stored in the form of ketoacids (deaminated) from where they start towards protein synthesis.

The tendency towards the formation of one or the other aromatic compound comes mainly from the yeast strain. On the other hand, the greater general availability of organic nitrogenous resources facilitates the complexity and quality of the aromas.

## Importance of the strain:

There is a genetic tendency among the different yeast strains towards the formation of a greater or lesser amount of fermentative aromatic compounds, thus, for example, the **PASION** strain is characterised by its high production of tropical-type aromas (2-phenyl acetaldehyde), while the **AURA** strain produces a large amount of fruit esters with pineapple and banana type descriptors (isoamyl acetate).



Amino acid		Alcohol		Ester		Aroma
Valine	→	Isotabunol	→	Isobutylacetate	→	Apple
Isoleucine	→	Isoamyl	→	Isoamylacetate	→	Banana
Leucine	→	Amyllic	→	Amylacetate	→	Banana and strawberry
Phenylalanine	→	Phenylethanol	→	Phenylacetate	→	Rose

## viniferm AURA

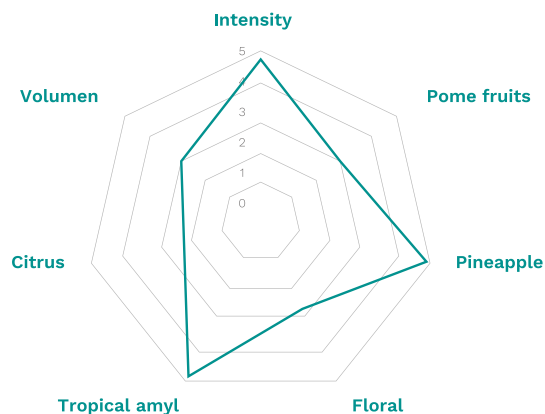
Dose: 20-30 g/hl | Package: 500 g



Amyl profile and fermentative safety.

### Elevated production of fermentative aromas.

- Development of white wines and rosés from neutral varieties.
- Highly-persistent aromas over time. Intensifies the tropical fruit characters (pineapple/banana).
- Fermentations controlled with highly clarified musts.
- **Wine profile:** Wines with fresh and fruity aromas.



## viniferm PASIÓN

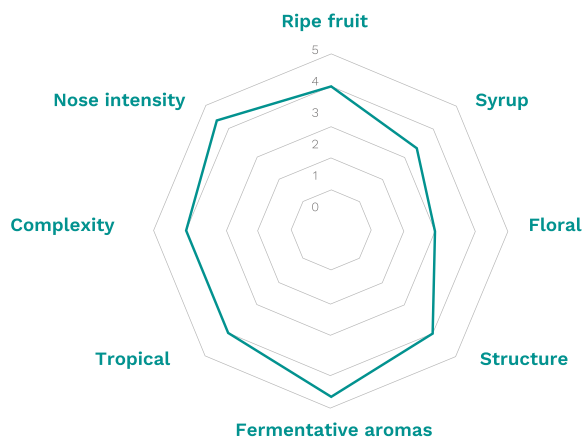
Dose: 20-30 g/hl | Package: 500 g



Tropical and fruity aromas.

### Very stable fermentative esters and aromas over time

- Development of white wines and rosés such as Airén, Palomino, Macabeo, Tempranillo and Garnacha.
- High-quantity production of ester-type aromatic compounds.
- Aromas of syrup, stewed notes and floral touches
- **Wine profile:** Aromatic wines with tropical complexity.



### Maximum amyl expression

#### Objective

#### Product

Extraction of precursors

Enozym LUX

Formation of aromas

Actimax NATURA

Aromatic protection.

SuperBouquet EVOLUTION

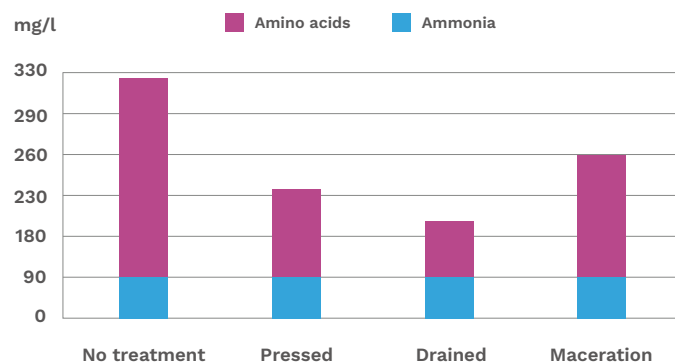
# ● Yeasts for rosé wines

## Particular fermentative difficulties

In the fermentation of the rosé must, the yeasts have to work on a very clean must, clarified after cold maceration, with very low turbidity from skin maceration and pressing. Significant cation load and low pH. The potential alcoholic strength is usually not low (> 12% vol).

The fermentative difficulties are aggravated when the work protocol is not specific (taking advantage of red production bleeding). This means that the risks of fermentation stoppage are greater in the production of rosé wines and their resolution is more complex. Likewise, one of the most frequent problems is the genesis of reduction problems.

## YAN content in grapes and must



- NFA content in the must is inferior than in the grape.
- The must obtained by draining drastically lowers the YAN content.
- The ammonia content remains stable.
- Decreases the proportion of amino acids (organic nitrogen).

## Nutrition: Key factor in the manufacture of rosés

The rosé musts are naturally poor in nutritional substances. Their fermentations benefit from the contribution of nutrients, especially in the form of inactive or autolysed yeasts (Actimax NATURA), which also provide support and supplement vitamins and minerals. Their use eliminates reduction risks and provides a more complex aromatic profile.

## Colours for rosés

Rosé is not a monolithic wine. There is a wide variety of rosé wines that offer different aromatic and chromatic profiles.

In order to expand its collection, in response to market demand for rosés, AGROVIN's R&D department has worked to select a new yeast strain for rosé wines with a high aromatic intensity, suitable for working in difficult conditions (low temperature, highly clarified must):

viniferm® **EMOCIÓN**

## High expression complex thiol rosés

### Objective

Aromatic production  
and increased volume

### Product

viniferm <sup>NS</sup> **TD**

viniferm **REVELACIÓN**

Formation and protection of aromas

Actimax **VARIETAL**

Thiol protection

**SuperBouquet EVOLUTION**



## viniform **EMOCIÓN**

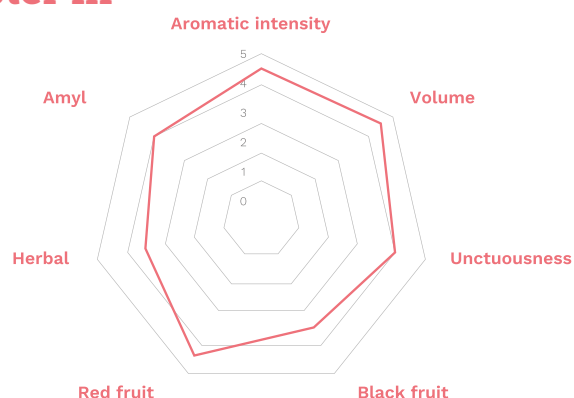
Dose: 20-30 g/hl | Package: 500 g



**Intensely fruity rosés.**

**Excellent balance in the production of amyl-type fermentative aromas and of a fruity character in rosé winemaking at low temperatures**

- Fermentation at low temperatures.
- Development of rosés with elevated intensity and aromatic persistence.
- Production of amyl aromas.
- Very good fermentation kinetics.



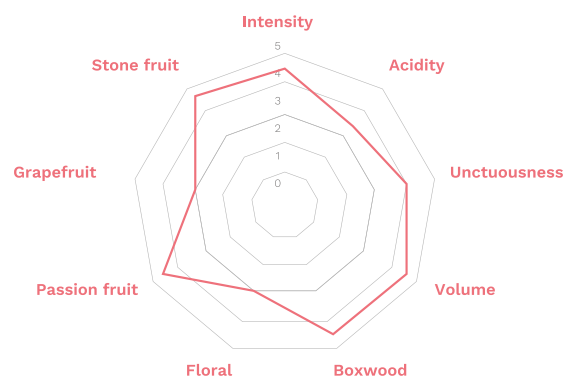
## viniform **DIANA**

Dose: 20-30 g/hl | Package: 500 g

**Varietal and/or barrel-fermented rosé wines.**

**Release of volatile thiols, with the expression of fermentative aromas of a floral nature**

- Development of varietal rosé wines.
- $\beta$ -Liasa activity.
- Recommended for use in very clean musts.
- Passion fruit aromas.



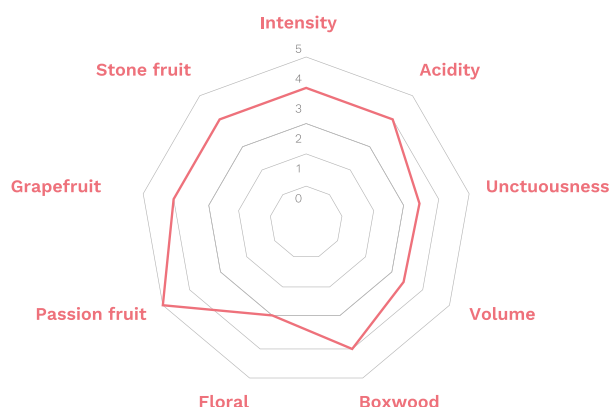
## viniform **REVELACIÓN**

Dose: 20-30 g/hl | Package: 500 g

**Plenitud aromática. Varietal thiol profile.**

**Release of volatile thiols**

- Recommended in inverted thermal fermentation.
- Development of thiol rosé wines.
- Production of grapefruit, citrus aromas.
- $\beta$ -Liasa activity.



# ● Aromatic yeasts for red wines

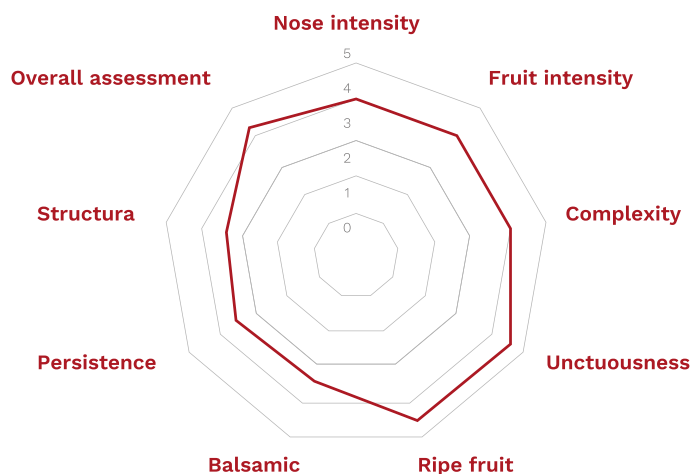
viniferm **Carácter**

Dose: 20-30 g/hl | Package: 500 g

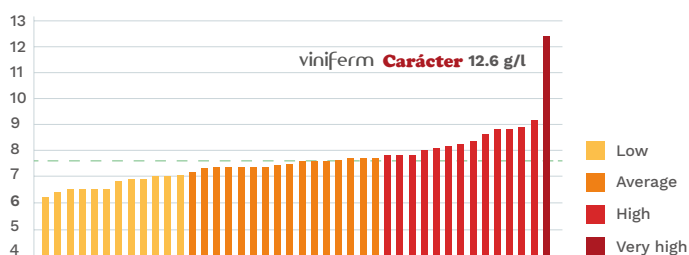


**Varietal notes with balsamic nuances.**

- Indicated for the manufacture of Premium red wines.
- A highly glyceric strain provides body and a sensation of volume in the mouth.
- Enhances fruity aromas (currant, plum, raspberry, blackberry) while enhancing the structure in the mouth.
- Ideal for Tempranillo, Garnacha and Merlot varieties.



Production of glycerol (g/l)



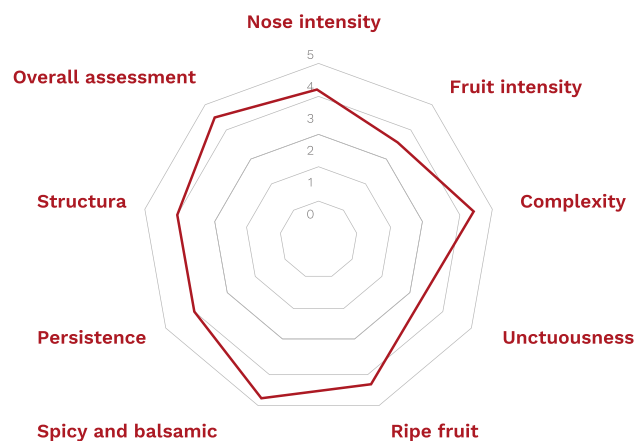
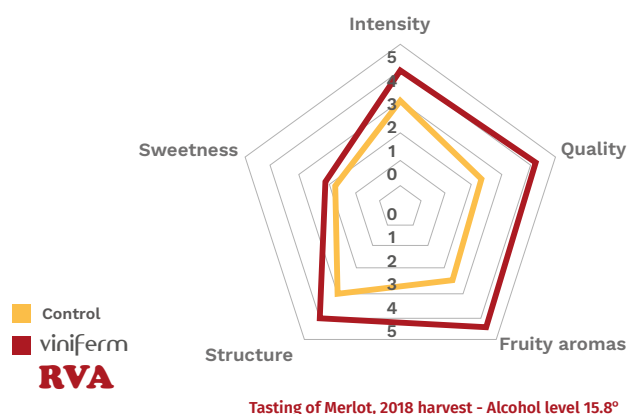
viniferm **RVA**

Dose: 20-30 g/hl | Package: 500 g



**Fruit and structure in wines with high alcohol potential.  
Less alcoholic wines.**

- Indicated for manufacture of red wines with long macerations.
- Helps protect and increase the colour intensity in the manufacture of red wines.
- Interesting for wines intended for aging in wood.
- Excellent results in co-inoculation with Viniferm OE lactic acid bacteria.
- Ideal for Merlot, Cabernet Sauvignon and Tempranillo varieties.



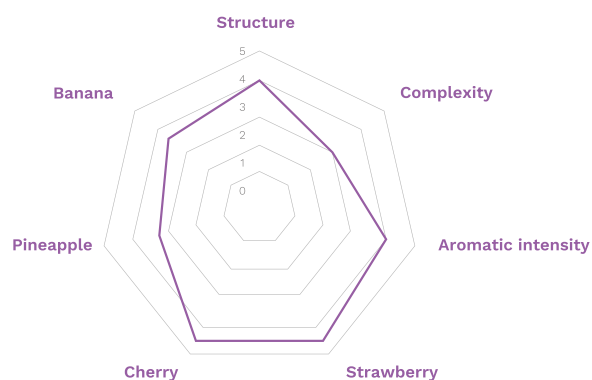
## viniferm Sensación

Dose: 20-30 g/hl | Package: 500 g



### Fruit profile with structure in the mouth.

- Recommended strain for the production of young reds with short macerations.
- Produces high levels of fermentative fruit esters such as strawberry and cherry.
- Ideal for Mediterranean varieties such as Syrah, Monastrell, Tempranillo.



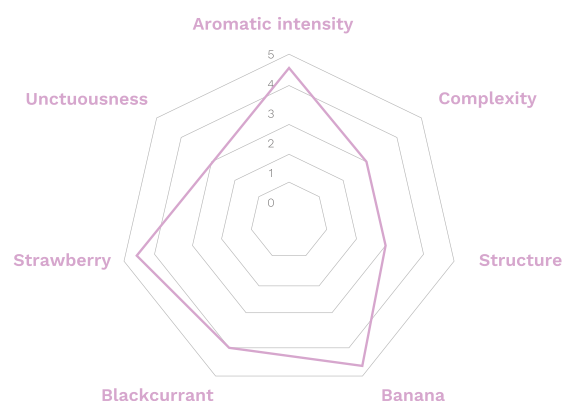
## viniferm TTA

Dose: 20-30 g/hl | Package: 500 g



### Young aromatic red wines.

- Indicated for carbonic macerations and very aromatic wines.
- Allows for the characteristic expression of varietal aromas (red fruits: cherry, currant, strawberry).
- Ideal for Merlot, Cabernet Sauvignon and Tempranillo varieties.



viniform **ÉLITE**

Dose: 20-30 g/hl | Package: 500 g



Exalts the characteristics of the terroir.

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

### Characteristics

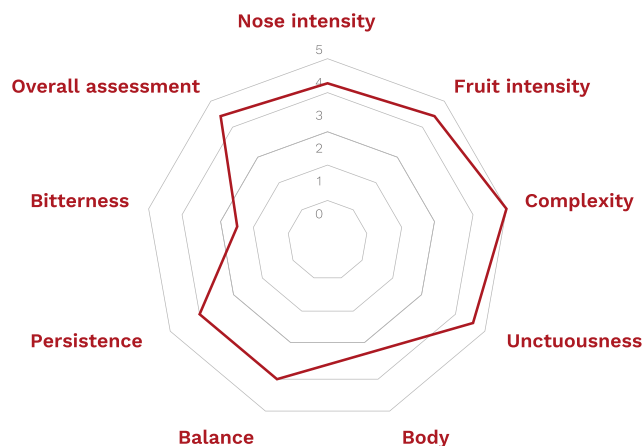
- **More microbiologically stable wines:** lower incidence of alterations (Brettanomyces, among them).
- **Wines with no residual sugars:** their resistance to ethanol leads to alcoholic fermentation until the total exhaustion of sugars.
- **Less alcoholic wines:** their low sugar/ethanol yield makes it possible to harvest at the optimal time of ripeness.
- **Wines with no reduction notes:** it does not produce hydrogen sulphide, preventing reduction derived from the lack of nitrogen in the environment and the ripeness of the grape.
- **Varietal wines:** release of thiol precursors, also definitive in the aromatic palette of red wines.
- **Round wines, without edges, with integrated tannin and good aging capacity:** thanks to its glycerol production and parietal lysis capacity.

### Application

Varietal red wines, structured and elegant, manufactured from ripe grapes with high alcohol potential and later development in wood.

### Origin

Saccharomyces cerevisiae var. cerevisiae.  
Strain resulting from the research results of the NUTRIAROMA Project, "Development of Viticultural and Oenological Strategies and Methods in the face of climate change", obtained within the collaboration between Agrovin and the Complutense University of Madrid (2015-2017). Isolated from vineyards of Vitis vinifera cv. Merlot, Burdeos (France).



### Organoleptic qualities

#### Medium-high intensity wines

Very complex and dominant profile with predominance of red and black fruit flavours, accompanied by persistent floral notes. Absence of overripe notes.

#### In the mouth

It stands out for its good integration of the tannic complex, providing volume and structure. Elevated persistence.

### Oenological properties

- Short latency phase.
- Rapid fermentation speed.
- Resistance to ethanol: 16 %.
- Average Alcoholic yield
- Medium assimilable nitrogen needs, optimal results with **Actimax NATURA**.
- Low acetic acid production.
- Low production of SO<sub>2</sub> and SH<sub>2</sub>.
- Excellent implantation in the media, both due to its competitive capacity and for the Killer phenotype.



UNIVERSIDAD  
**COMPLUTENSE**  
MADRID

viniferm **3D**

Dose: 20-30 g/hl | Package: 500 g



Production of polysaccharides.

**Intensifies the aftertaste, providing presence and volume.**

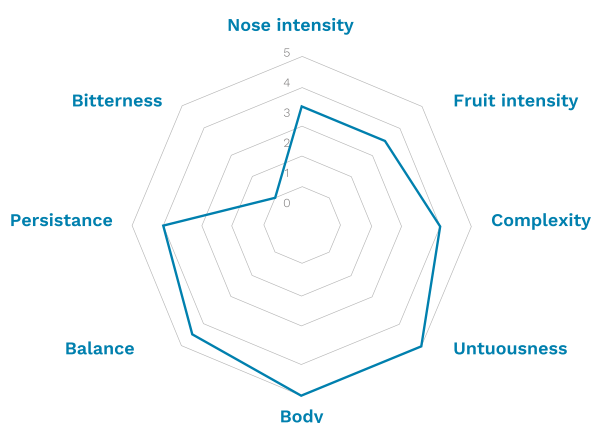
Distinguished by its significant production of mannoproteins during the fermentation and post-fermentation phase that give the wine volume, roundness and length in the mouthfeel.

Yeast for Mediterranean wines, makes it possible to develop aromatic and flavour characters of high-quality red grapes.

Wines made from ripe grapes with high ethanol content and a strong phenolic presence require sufficient structure to avoid sensations of warmth and dry or bitter notes.

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

**In the manufacture of white varieties, it provides great unctuousness through the release of mannoproteins, with descriptors of stone fruits and white fruits.**



ProyectoDeméter



Instituto de  
Ciencias de la  
Vid y del Vino

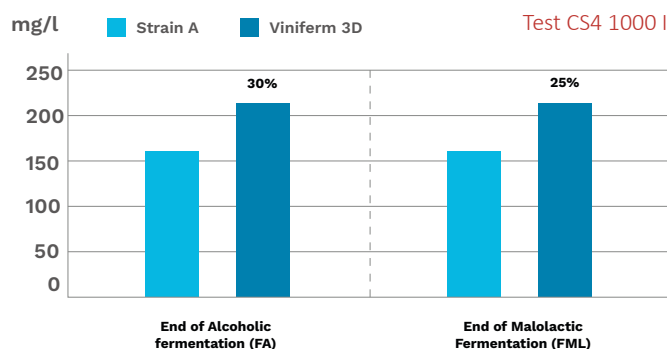


TORRES

Strain resulting from the CENIT DEMÉTER project.

Developed in collaboration with Bodegas Torres S.A. and the ICVV of the CSIC.

**Release of mannoproteins,  
comparison between yeast strains.**



Cabernet Sauvignon.

Mannoprotein analysis was performed by isolating the macromolecular fraction of the wines and its subsequent hydrolysis and HPLC analysis. Samples were analysed in duplicate, according to Quirós, M., Gonzalez, R. and Morales, P. 2012. A simple method for total quantification of mannoprotein content in real wine samples. Food Chemistry 134:1205-1210.

viniferm **CT007**

Dose: 20-30 g/hl | Package: 500 g

Favors tartaric stability.

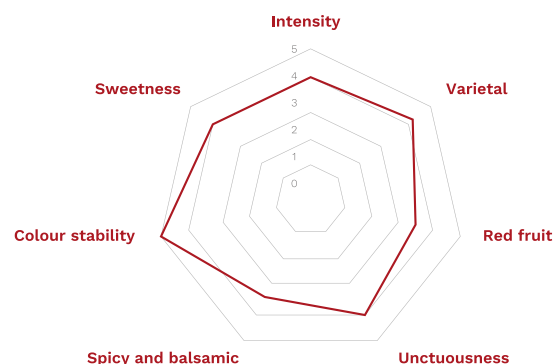
enotecUPM  
Universidad Politécnica de Madrid  
Agrónomos, Tecnología de Alimentos



**Ideal for pre-fermentation cold maceration  
Production of stable pigments**

Anthocyanin pyros are small molecules that are formed mainly during fermentation through the reaction between malvidin and fermentative metabolites. These compounds are more stable over time because they are not affected by variations in pH, T and SO<sub>2</sub>.

This group of molecules includes Vitisins A and B, compounds synthesised by Viniferm CT007, giving rise to greater colour stability in wines fermented with this strain.



viniform **Direct**

Dose: 20-30 g/hl | Package: 500 g

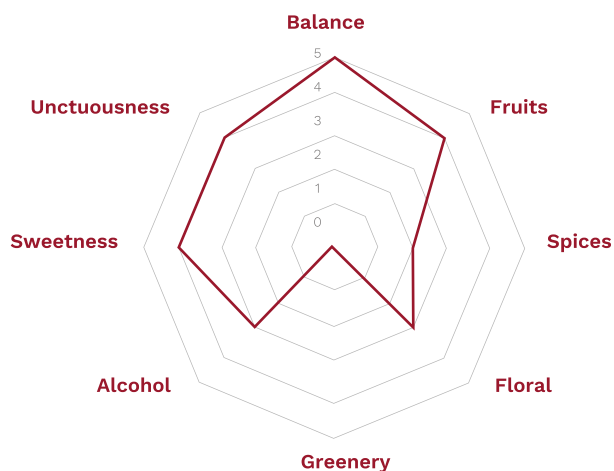
## Direct inoculation yeast to enhance the varietal profile

Viniform Direct is a fast-setting yeast with a marked varietal profile. Its high release of polysaccharides improves smoothness on the palate in structured wines with a high polyphenolic component.

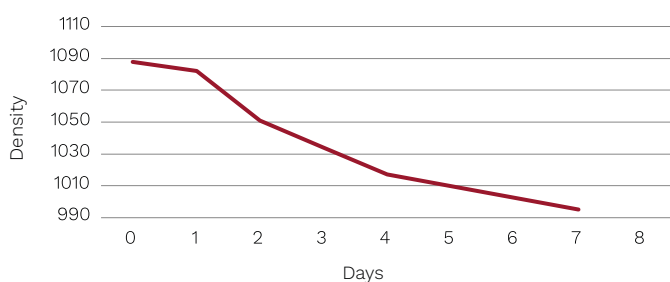
It also allows for the rebalancing those elaborations from grapes with less ripening balance.

### Oenological properties

- Direct addition yeast.
- Elevated thickness of phospholipid membrane.
- Short latency phase.
- High resistance to osmotic stress.
- Low Volatile Acidity Production.
- Elevated range of working temperatures (16-28°C).
- Varietal persistence.
- 15% Ethanol tolerance.

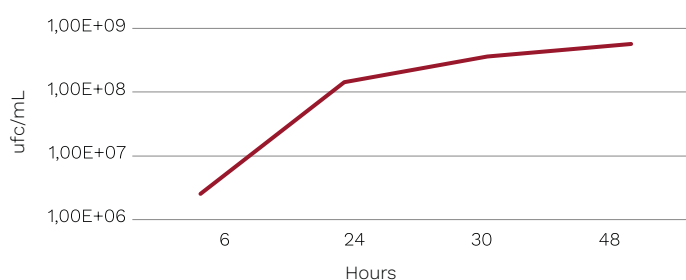


### Fermentation kinetics of a must after direct addition with Viniform Direct at a temperature of 20°C



Viniform Direct implantation is 100% in the determination carried out below density 1040.

### Yeast population in the must after direct addition with Viniform Direct at a temperature of 20°C



It is observed that yeast populations reach optimal levels for fermentation.

# ● Non-Saccharomyces Yeasts

viniferm <sup>NS</sup>TD

Dose: 20-30 g/hl | Package: 500 g



Microbiology Department II  
Complutense University of Madrid.

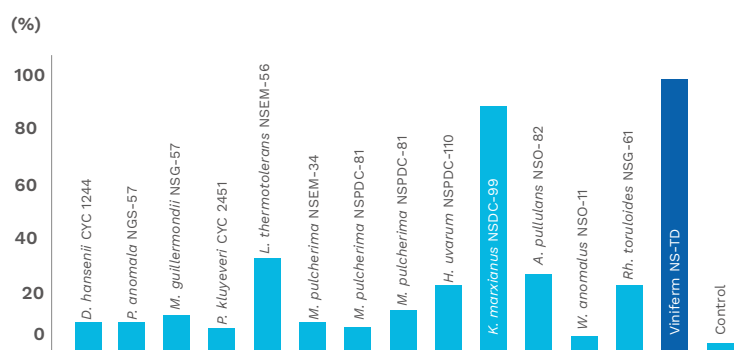
Recommended for sequential fermentation.

## Sensory enhancement and increased complexity in wine's aromatic and flavour registers.

The heading of Non-Saccharomyces includes different genera and species of yeasts present in the natural process of making wine and are different from the fermentative species par excellence that is *Saccharomyces cerevisiae*. In recent years, the oenological sector has turned towards the use of the resources offered by this biological diversity. Today it is known that the beneficial properties of these microorganisms should be specified at the level of each strain, not species.

For example, the *Torulaspora delbrueckii* NSTD strain has unusual sensory characteristics, demonstrated over several years of research. But in addition, this strain, unlike other strains of its own species, has a high prevalence in alcoholic fermentation, which enables its use in mixed culture from the beginning, together with the desired *S. cerevisiae* strain, and therefore facilitating use in the winery.

### 1. B-lyase activity of different non-Saccharomyces yeasts.



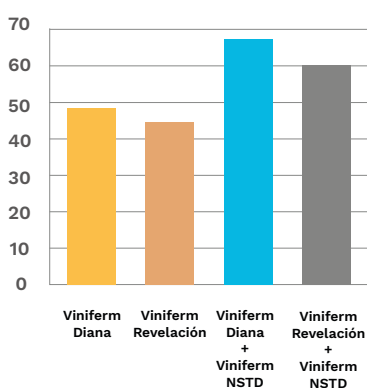
### Characteristics

- Greater sensation in the mouth and depth in the aftertaste.
- More glyceric wines, greater volume in the mouth.
- Greater complexity and aromatic intensity.
- Increased length of the aroma.

1: B-lyase activity of different non-Saccharomyces yeasts.  
The Viniferm NS-TD activity is notable. Belda et al. (2016) [4].

### 2. Production of fermentative aromas.

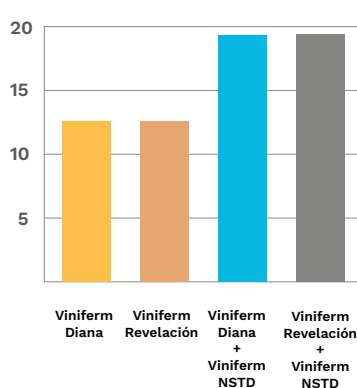
Ester content (mg/l)



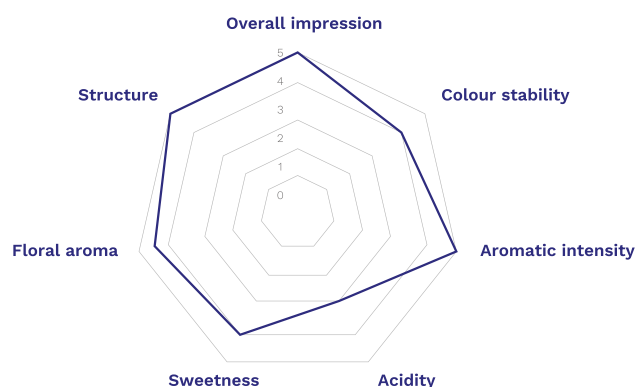
2: Formation of esters after fermentation of a Sauvignon Blanc must using *S. cerevisiae* and in combination with the NSTD strain

### 3. Increased volume and reduction of astringency

Ethanol index (%)



3: Ethanol index (shows the amount of tannins condensed with polysaccharides) after fermentation of a Sauvignon Blanc must using *S. cerevisiae* and in combination with the NSTD 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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#### Static clarification

Premium musts	P. 42
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#### Enzymes for white wines

Enozym Extra Arome	P. 44
Enozym Lux	P. 45

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#### Enzymes for red wines

Enozym Vintage	P. 47
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# 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. Flotation.	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.	>300 ml/1000gal
			Cold settling improved. Filtering.	>75 ml/1000gal
<b>Enovin FI</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.

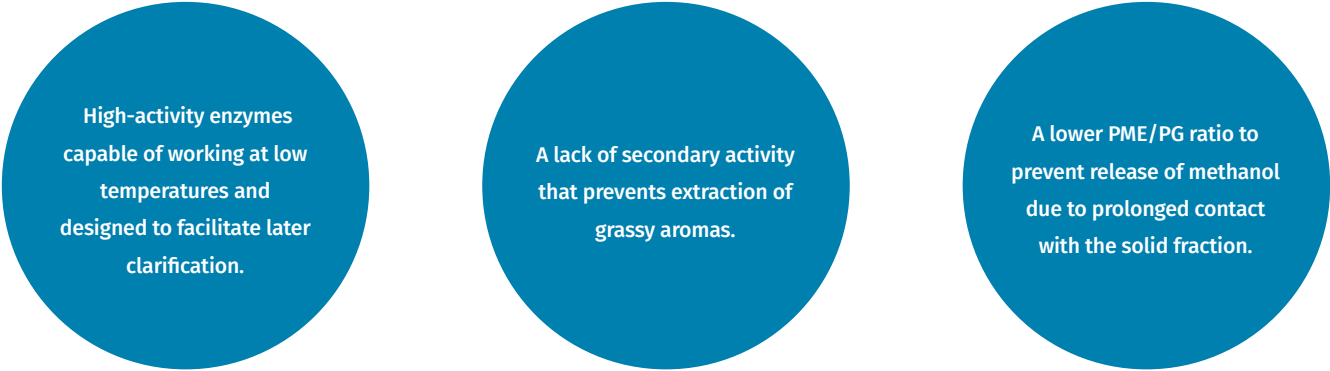
Refrigeration has to be done quickly (within a maximum of 3 hours) and the temperature needs to be stabilized at around 40 °F(it must

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.

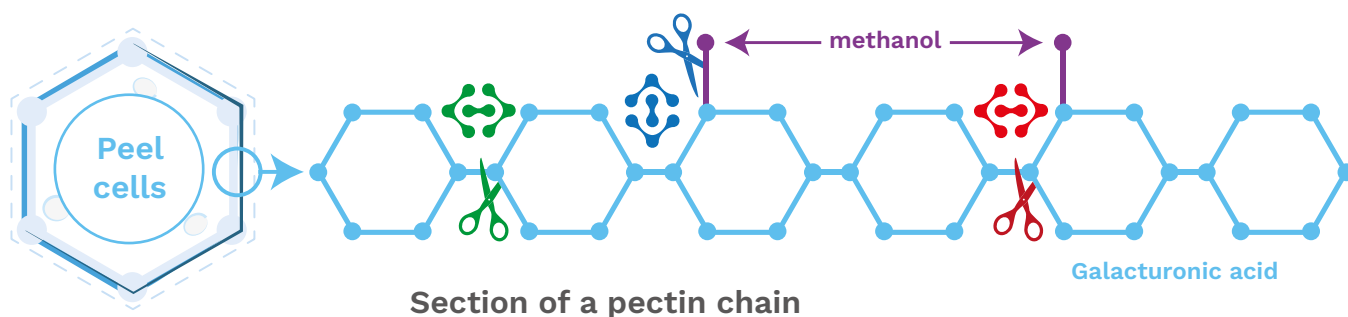
A lower PME/PG ratio to prevent release of methanol due to prolonged contact with the solid fraction.

## 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)

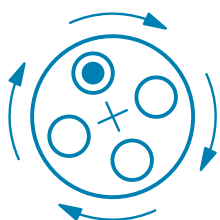
The **PL** rapidly reduces must viscosity. The **PG** requires preliminary action by the **PME**, and results in complete pectin solubilization.

### 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: 0,4-0,8 ml/hl | Package: 100 g and 1 kg

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.

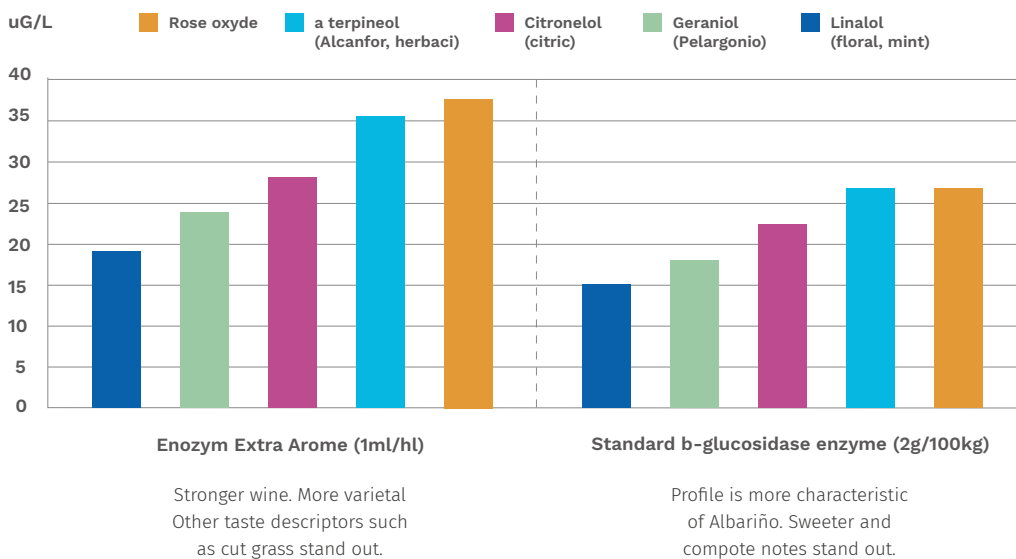
Can be applied directly to grapes.

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 **Standard b-glucosidase enzyme** (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: 0,4 ml/hl | Package: 100 g and 1 kg

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.

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.

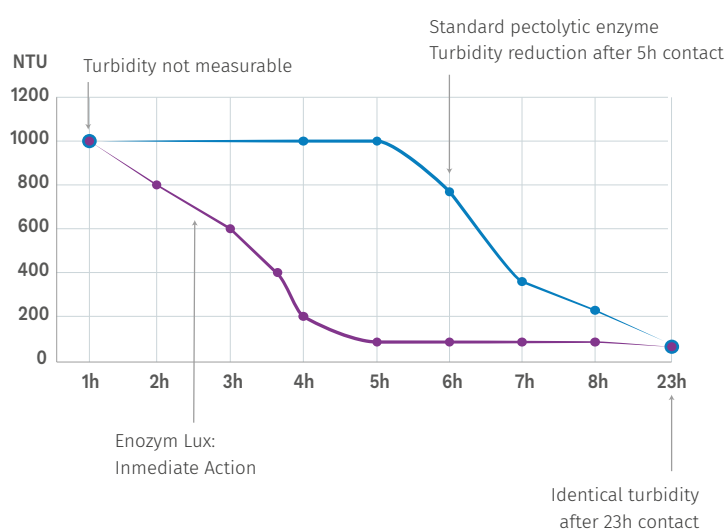
Enzyme activity: Highly concentrated pectinase.  
Rich in pectin lyase.

Purified and concentrated enzyme preparation (FCE).

Performs rapid depectinization at low temperatures.

Can be applied directly to grapes.

### Static settling comparison between Enozym LUX and a standard pectolytic enzyme



Standard pectolytic enzyme

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.

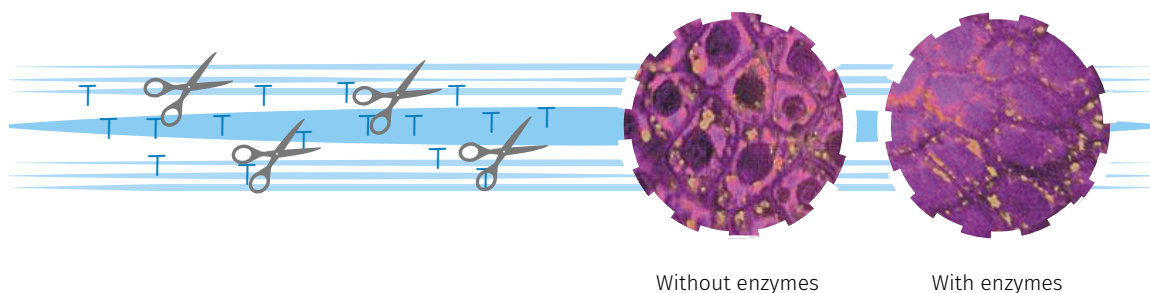
- They act on the grape's peel, degrading the polysaccharide components and favoring inter- and intra-cell disaggregation and facilitating tannin release.
- Facilitate release of its anthocyanin and aroma content.
- They act on the proteins in the vacuole membrane and, by degrading it.
- They establish 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.
- **Absence of cinnamyl esterase (FCE):**  
Collaborates in formation of volatile phenols, causing significant sensory defects.

## Peel cells after FA



## Enozym VINTAGE

Dose: >1 g / 100 kg | Package: 250 g

### 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

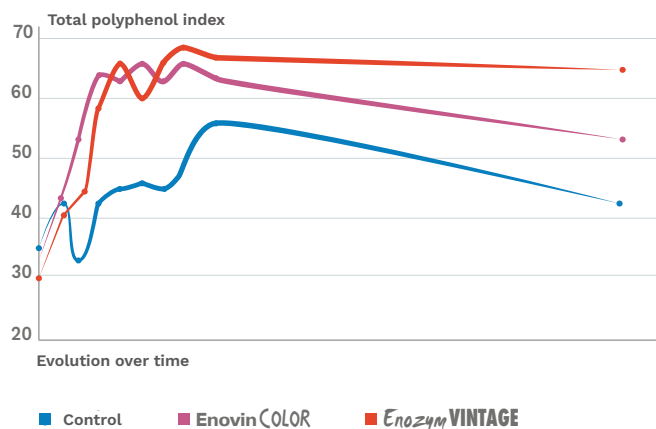
During maceration, winemakers not only endeavour to maximize phenolic compound extraction, but also to maintain phenolic stability over time. This is especially important in wines intended for ageing.

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

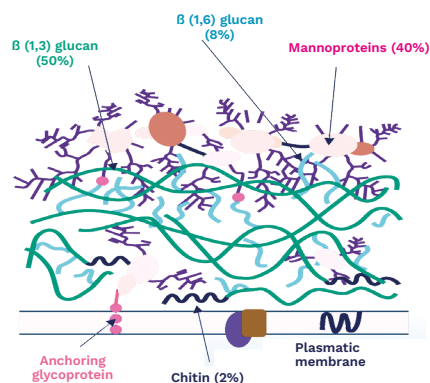
Because it increases bleed-off and pressing yield and enhances fining and filtering. It also prevents turbidity and later filter silting. Enzyme preparations are particularly recommended for unevenly ripened and lower-quality vintages.

### 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. 51
Proveget PREMIUM	P. 51
Vinigel CRISTAL	P. 51



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>Enozym LUX</b>	1-2 ml/hl	High-pectin-lyase-content (PL) enzyme. <b>Non-animal origin</b>
<b>Enovin FL</b>	75-150 ml/1000gal	High-pectin-lyase-content (PL) enzyme.
<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*

Dose: 50-200 ml/hl | Package: 22 and 1200 kg

**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*

Dose: 50-200 ml/hl | Package: 20 and 1200 kg

**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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## Vinigel *CRISTAL*

Dose: 50-250 ml/hl | Package: 5, 22 and 1000 kg

**Clarification of balanced and structured wines.**

### Respect for aromatic expression and tannic structure of the wine.

Purified and slightly hydrolyzed liquid gelatin obtained from collagenous substances. With excellent clarifying action that effectively balances the polyphenolic structure, establishing the structure of the wine.

The wine maintains its aging potential and its aromatic qualities.

# 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. 54
Tanicol ONE	P. 55
MannoCROM	P. 55
MAnnoBLANC	P. 55

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## Sensory improvement in maceration

Tanicol Red Sense	P. 56
Manno Arome	P. 56
Tanicol Red Vintage	P. 57
Tanicol Blanc Excellence	P. 57

## 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.

	Tanicol <b>REDSENSE</b>	<b>Manno</b> <b>AROME</b>	Tanicol <b>BLANC</b> <b>EXCELLENCE</b>	Tanicol <b>RED VINTAGE</b>	Tanicol <b>VINTAGE</b>	Tanicol <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**

Dose: 10-20 g/hl | Package: 1 kg and 10 kg

100% grape-seed tannin.

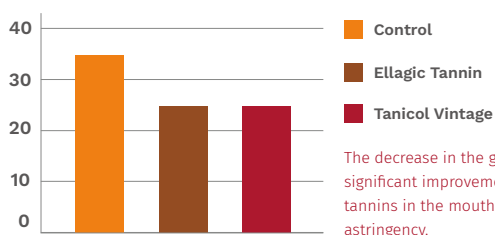
## Condensed grape-seed tannin with great effect on color stability.

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..

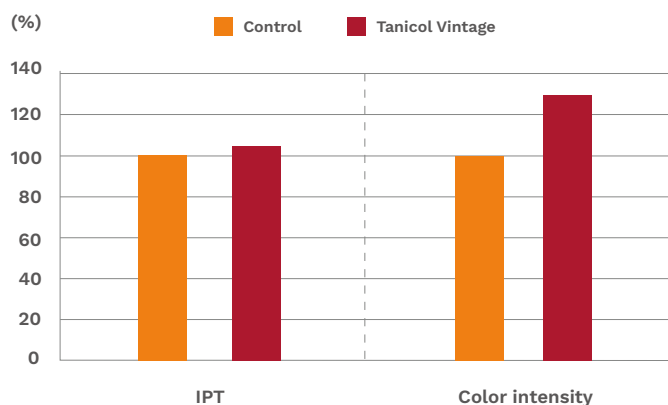
- Improves coloring stability
- Provides body and structure
- Easily dissolved
- Powerful antioxidant

### Gelatin index

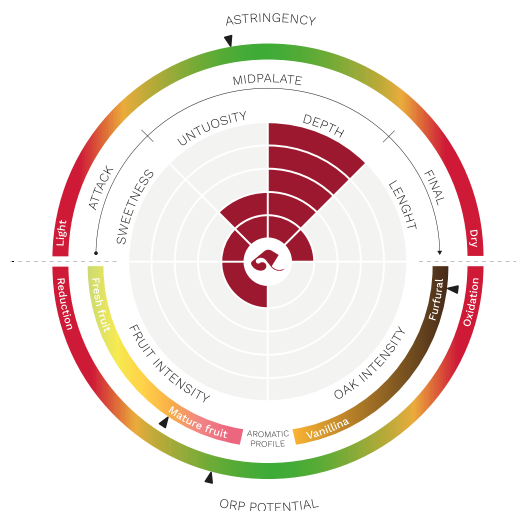


	Control	Tanicol <b>VINTAGE</b>
<b>TPI</b>	42,1	45,2
<b>Color intensity</b>	8,1	10,4
<b>Total tannin content (mg/l)</b>	1439,2	1634,9
<b>Total anthocyanin content (mg/l)</b>	658,9	684,8

### 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.



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DEGLI STUDI  
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** | Tanicol **ONE L**

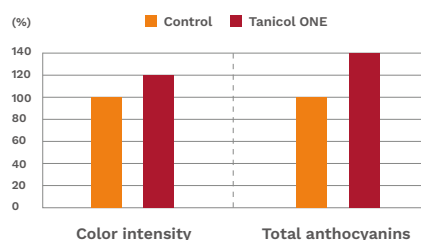
Dose: 10-40 g/hl | 30 - 120 ml/hl Package: 1 and 15 kg | 22 kg

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.

## MannoCROM

Dose: 15-35 g/hl | Package: 1 kg

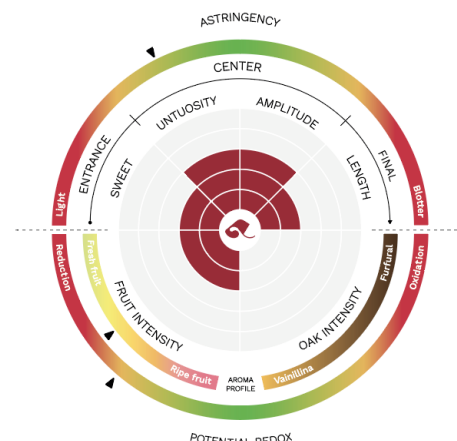
Structure and stability in red wines.

### Increases structure and volume in wines.

Contributes to the sensory characteristics of the wine, polishing the aggressive tannins, decreasing astringency and increasing the sensations of body and volume in the mouth.

The contribution of procyanidins (proanthocyanidinic tannin) reacts with anthocyanins forming very stable bonds, **improving colour stability** and its evolution over time. The increase in the concentration of mannoproteins favors the colloidal protection of the polyphenolic fraction, preventing the precipitation of colouring matter.

**Composition:** Preparation based on inactive yeasts and proanthocyanidinic tannin, rich in mannoproteins with structuring and stabilising action. Contains tannins condensed from the grape.



## MannoBLANC

Dose: 15-35 g/hl | Package: 1 and 10 kg

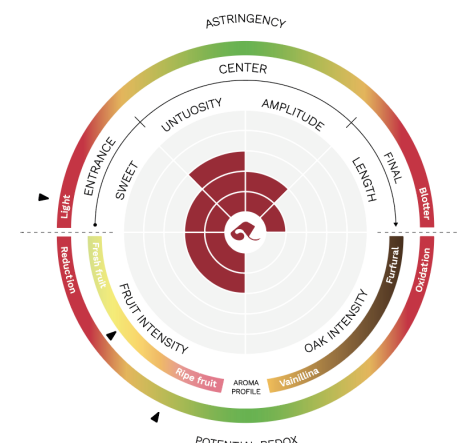
Aromatic intensity and volume in the mouth.

### Aromatic stability and intensity.

Used from the early stages of winemaking, it protects the aromas and freshness of white wines and increases the mannoprotein fraction, resulting in fattier, rounder and more persistent wines.

Recommended for the production of white wines with a marked varietal character or for those in which the subsequent aging on the lees is desired. Provides lees that are more free, less reductive and more microbiologically stable.

**Composition:** Preparation rich in polysaccharides and antioxidant tannins, designed to promote maximum aromatic expression in the production of white wines.



# Sensory improvement in maceration

## Tanicol **REDSense**

Dose: 10-40 g/hl | Package: 1 kg

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)

#### High protein reactivity

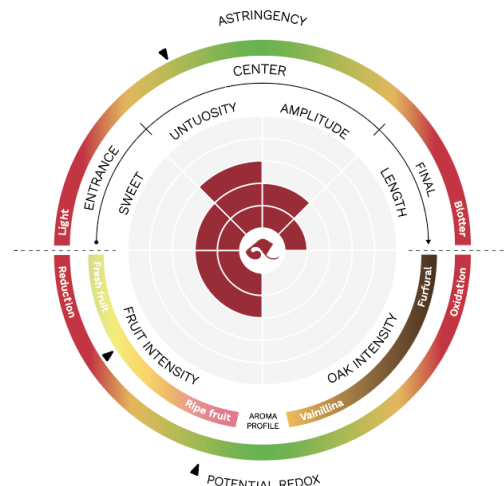
Protects the grape's natura phenols.

### Sensory enhancement

**Visual** → Increase of the color intensity and stability

**Olfactory** → Red fruit aromas

**Mouthfeel** → Structure increase with no astringency



## Manno **AROME**

Dose: 20-50 g/hl | Package: 10 kg

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



## Tanicol **RED VINTAGE**

Dose: 10-20 g/hl | Package: 1 kg



**Accentuated fruit notes.**

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

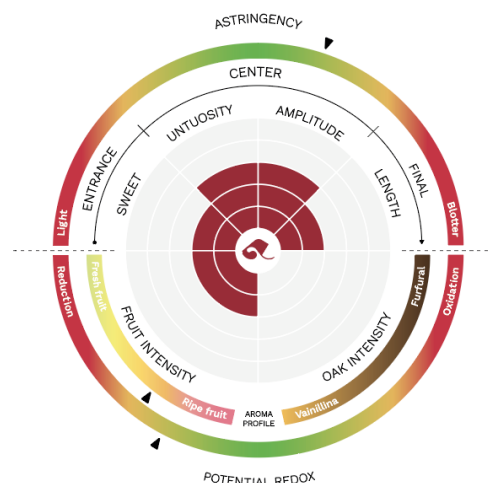
When devatting, clarifies and defines the varietal characteristics. When applied to vintage wines or at pre-bottling, it enhances the descriptors of red and black fruits (cherry, strawberry, plum, blueberry).

### 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**

Dose: 1 - 15 g/hl | Package: 1 kg

**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.

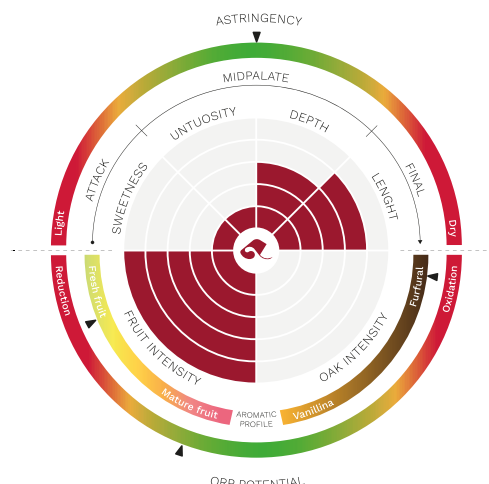


### Antioxidant Effect

- 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 in manufacture

Oak has been part of wine for centuries and its benefits are widely known: longer-lived wines with a better Balance, more expressive, more complex and, in conclusion, with more prestige and reputation in the market.

At first it was a simple transport tool, and in this way it became known and developed as used today, although its use is still an art, a completely handmade trade.

Oak in the world of wine plays a key role in many aspects and at many points during the development. We can find 800hL tanks for very discreet aging, going through the different sizes of barrels, blocks, staves, chips and splinters and finally the toppings. Each product has its pros and cons, its proper moment for use and in fact, they can even work synergistically. They are not antagonistic. Depending on the intended wine, the complexity sought and the time spent, we may use one product or another. All formats obviously have different functions and are even used together, and should be. The most important thing is to determine what each wine requires at all times and use the most appropriate technique or product.

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## Oak and wine

Pg. 59

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## Line of SPIRIT products

Spirit Nature  
Spirit White

Pg. 60  
Pg. 61

# ● Oak and wine

Currently, as in the past, wines are aged with oak from fermentation in order to determine the character of the wine in a more delicate and effective manner. In modern wines we could say that oak is an absolute necessity.

## Why oak?

There are many benefits, including the following:

- 1 Modifies the phenolic composition of the wine in a quantitative and qualitative manner. —————> Reduces astringency, improving the wine's redox power
- 2 Extracts many types of compounds that increase the aromatic complexity while also increasing the overall sensation of texture in the mouth.

Other decisive points when working with oak that have a direct impact on the wine are toasting, botanical origin, size, degree of toasting and oak treatment. In this section, we'll look at characteristics that make us very special and unique.

## Effect - Interaction

The wines are alive and change over time, and the wine from the same plot of land will be different every year. There are so many variables that interact to make each wine unique. It is very important to determine and analyse the wine each year during production, because it will always interact and respond to aging differently, depending on its **innate characteristics** (amount of tannins and style of tannins, style of fruit maturity, etc. ) and the **state** in which they are found (tannin polymerization, REDOX potential, oxygen consumed).

Given these parameters, each wine must be treated and processed according to each harvest and according to the established objectives, because what we will ultimately achieve is simply a change in the wine's **character**, not its quality.

Our "know-how" has helped us move towards a protocol with a vision focused on the quality of the wine and on preserving and highlighting the perception of the fruit.

## What makes us different?

We have chosen to work with the native Iberian oak (*Q. Pyrenaica*) for its great advantages over commonly used oaks. Iberian oak has all the benefits of American oak, that is, it provides us with many lactones and therefore a lot of sweetness, but it is also more respectful and is more reminiscent of French oak.



## This is the product that we recommend for use during fermentation: Unroasted Iberian oak in the "grain of rice" format.

Its main characteristics:

- **UNROASTED → SWEETNESS** → Not roasting the oak provides benefits, since many molecules can change their structure with heat; providing a lot of sweetness and respect for the raw material, while not interfering with the toasted aromas of the wine.
- **ELLAGITANNINS → REDOX** → Another key point during fermentation is the REDOX of the wine. This is a moment when many chemical changes occur and the wine can tend to reduce. With Spirit Nature, we help provide a better potential balance due to the high content of ellagitannins that regulate and act as a "buffer" with the REDOX.
- **FRUIT → LACTONES** → We help enhance the wine's fruitiness, due to proper REDOX management and thanks to the concentration of lactones. These play a key role in expressing the fruity character.



## What other problems can we help solve? Applications

### Insufficient phenolic ripeness

In many cases, we find grapes with maladjusted phenolic maturity and this translates into an imbalance in the texture, with astringency.

In these cases, we recommend using 0.8-1.2g/L of Spirit Nature during fermentation or just after devatting. It will provide structure and a very pleasant overall feeling of structure. Moreover, Spirit Nature will help a lot to mask the drying effect of immature tannins.

### Appearance of vegetal notes

Sometimes due to a stoppage in maturation or incomplete maturity, we obtain wines with unpleasant vegetable aromas.

Our recommendation is to use slightly higher doses 1.5-2g/L in the vat and also incorporate Spirit ROAST at 0.5g/L.

### Lack of structure

In high production vineyards, we can find the situation for grapes with a lack of structure

Spirit Nature can provide the necessary structure if you use between 0.5-3g/L, depending on the demand.

## How to enhance the fruit and increase roundness? Production protocol

### For what type of wines?

- **Wines with lack of definition and low aromatic potential** - grapes with low YAN and few aromatic precursors.
- **Wines with vegetal aromas and pyrazines** - immature grapes, ripening block.
- **Wines with reduction problems** - Grapes with green tannins that require a lot of oxygen, wines with unbalanced nutrition.
- **Wines with little colour and structure** (diluted), easily oxidized.

## Application

During fermentation and after fermentation for 6-8 weeks.

## Dose

- 0.75-1g/L for short-ripened red wines where the objective is to increase structure and protect colour.
- 1-1.25g/L Wines with a lack of fruit or reduction problems
- 1.25-1.5g/L red wines with vegetable aromas
- 1.5-2g/L Wines with a lot of body and very astringent tannins, lack of sweetness, etc.



**Specific product for white and rosé wines with medium-long toasting at low temperatures with the aim of enhancing aromatic freshness and freshness in the mouth.**

- **ACIDITY** → **Tannins** → Strongly affect the structure, helping to increase the sensation of acidity.
- **BALANCE** → **Aromas and tannins** → Increase the general sensation of texture, providing a bit of sweetness and smoothness, although its main function is the acid sensation and amplitude. In short, it helps provide more tension.
- **AROMATIC FRESHNESS** → Increases the sensation of fruit, floral aromas and fresh herbal aromas.

## How to increase freshness? Production protocol

### For what type of wines?

- **Wines with little aromatic potential and little complexity** - grapes with low YAN and few aromatic precursors
- **Wines with acidity and low pH** - grapes with a lack of acidity
- **Wines with very low concentration** - high-yield, low-concentration grapes

## Application

During fermentation and after fermentation for 6-8 weeks.

## Dose

- 0.5-0.75g/L for white wines with very little concentration and alcohol levels
- 0.75-1g/L white wines with good maturity and concentration
- 1-1.25g/L very mature white wines

If you want to add more complexity, increase the dose by 0.25-0.5 g/L

## Use a combination of products to get different characters

- Increase the sensation of red fruits and floral notes: 1 Nature + 0.5 Pure
- Increase the sensation of fruit and center the mouthfeel: 1Nature + 0.5 Core
- Increase the freshness and minerality (low redox): 1 Nature+ 0.5Roast



## Use a combination of products to get different characters

- Increase the sensation of ripe fruits and floral notes: 0.5 White + 0.5 Pure
- Increase the freshness and minerality (low redox): 0.5 White+ 0.3 Roast

# 08. 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.

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#### Selective fining agents

BCP XXI	P. 63
Triplex R	P. 63

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#### Vegetable fining agents

Proveget Bc	P. 63
Proveget Cristal	P. 63
Proveget Clar	P. 63
Proveget Fine	P. 63
Proveget 100	P. 63
Proveget Quit	P. 63
Proveget Premium	P. 63

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.

## 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>	Bentonite, 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

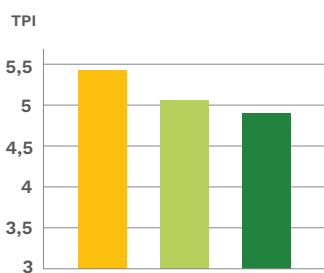
- They polish astringency, smoothening the mouthfeel.
- There is no significant loss of color intensity.
- There is no significant loss of intensity in the nose and they have a slight antioxidant effect.

## **Proveget QUIT**

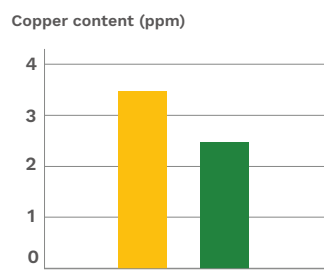
Clean and intensely aromatic wines.

## A natural solution for removing oxidizable polyphenols.

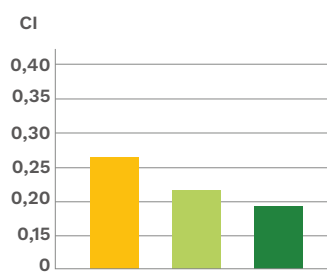
Decreased TPI



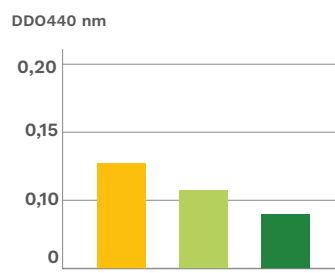
Lower levels of copper



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.

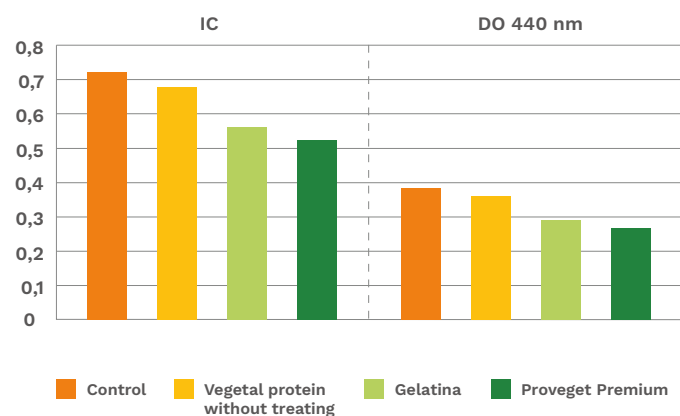
This treatment process alters the protein conformation, thereby achieving greater reactivity.

**Proveget Premium** is the result of the Winebalance project:

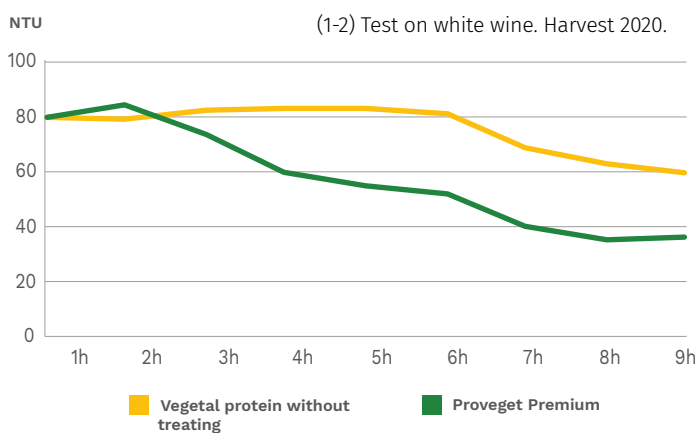
“Improving the colloidal structure of wine: New relevant bioactive tools”



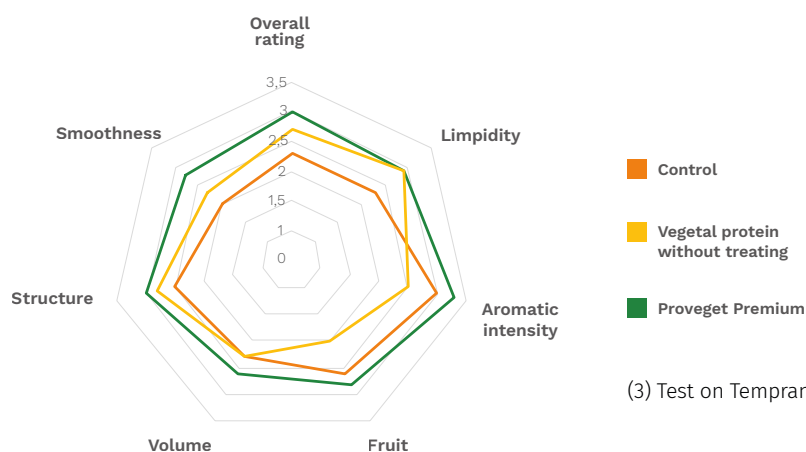
#### 1. Impact on color



#### 2. Sedimentation rate



#### 3. Greater respect for wine



(3) Test on Tempranillo. Harvest 2020.

# Notes

[illegible]

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