



C H A N G E

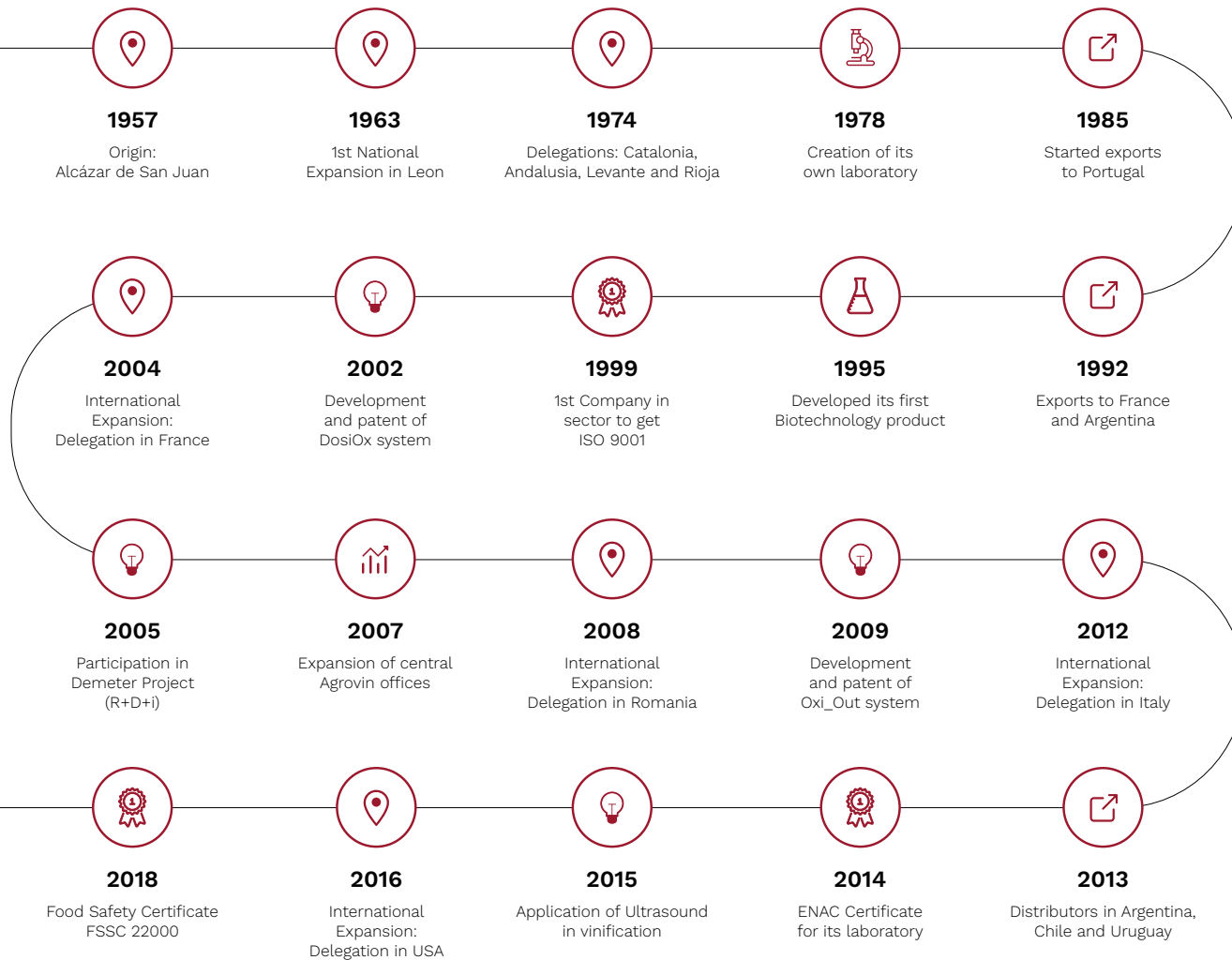
— TO MAKE IT BETTER

HARVEST NEWS 2023



“At Agrovin, we work to offer better solutions based on the needs of the wineries and the oenologists, taking into account the latest trends and advances in the sector”.

Agrovin Group. More than 65 years of history with you



Technology

36 national and international patents

- Ultrawine Perseo
- DosiOx
- Oxi-Out
- Ulises TDR²



Laboratory

35.000 oenological
analyses each year

+5.800 bottles of wine analysed

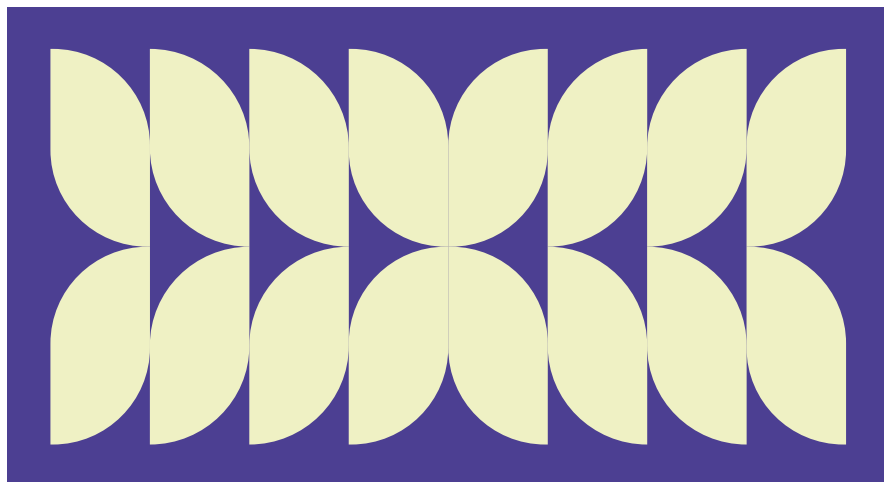


R+D+i

33 research projects
in 18 years

+35 m€ invested in the projects

Contents



01. *Non-Saccharomyces* yeasts

Pg. 6

In recent years, certain *non-Saccharomyces* species have given rise to great improvements in wines. At the Agrovín Group, we have developed our own line of *non-Saccharomyces* yeasts, Viniferm NS, to provide wineries with all the benefits made possible with these yeasts.

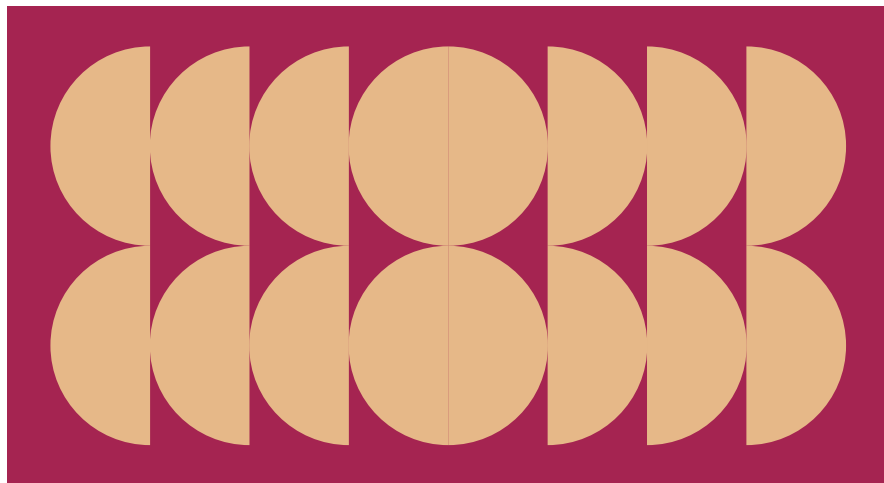


02. Direct addition yeast

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Viniferm Direct is a yeast specifically selected for its easy application in the winery with a good capacity to adapt to the limiting conditions of the must.

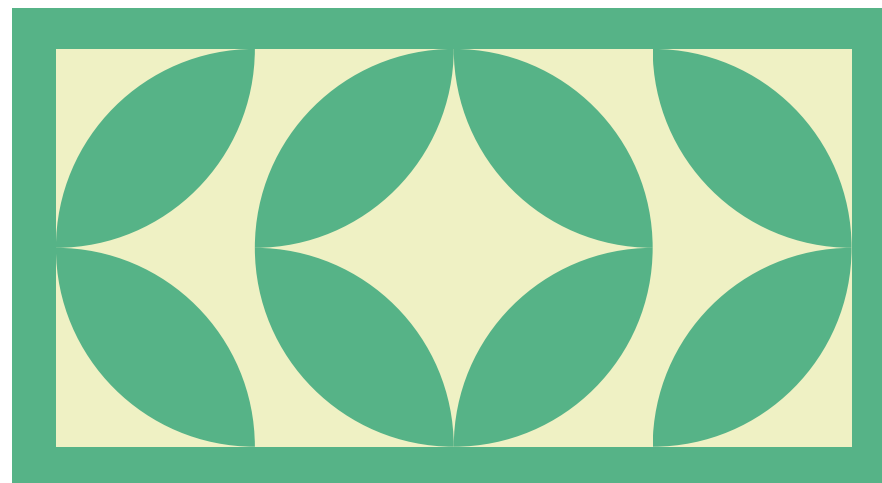
The production process and the intrinsic characteristics of the yeast strain favor the implantation of Viniferm Direct without traditional yeast hydration.



03. Natural clarification of wines

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At the Agrovin Group, in order to expand the line of alternative products to animal proteins, a fining agent based on yeast protein has been selected for refining wines.



04. Great alternative of SO₂ usage

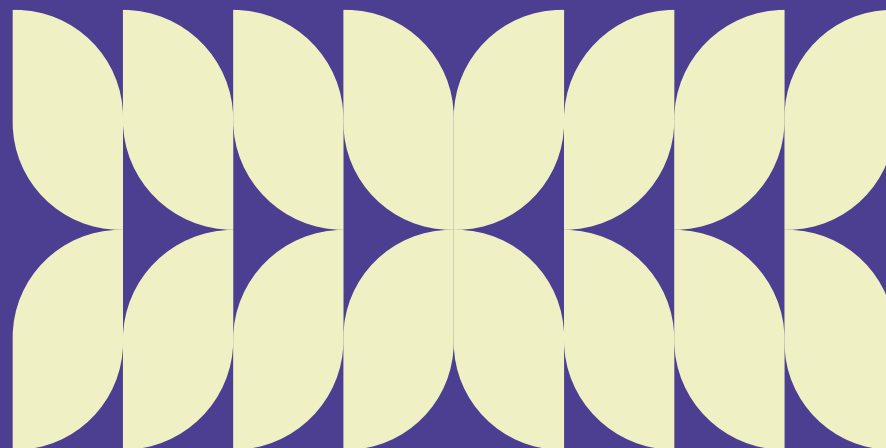
Pg. 16

The use of sulfur is nowadays intensive in wineries, but consumers are increasingly demanding wines with low sulfur content. Organic wine regulations and the irritant capacity of sulfur dioxide, together with the negative effects on the health of sensitive consumers, have led wineries to consider strategies to reduce its use.

Agrovin therefore have developed Microstab Protect, a solution suitable for organic wines, effective against oxidation and microorganism populations.

01

Non-Saccharomyces **yeasts**



During the development of the wine, there is a wide variety of species of microorganisms that develop according to the changing situation of the environment. Focusing on the fermentation phase, the predominant species are yeasts of both the *Saccharomyces* and *non-Saccharomyces* genera.

In the first stages of fermentation the predominant populations belong to *non-Saccharomyces*. They are the first to be implanted due to a better adaptation to the conditions of the must. Traditionally, work has been carried out with the aim of trying to inhibit the development of *non-Saccharomyces* populations in order to avoid organoleptic deviations.

In recent years, certain *non-Saccharomyces* species have given rise to great improvements in wines. At the Agrovín Group, we have developed our own line of *non-Saccharomyces* yeasts, Viniferm NS, to provide wineries with all the benefits made possible with these yeasts.

Within this line of products we offer:

viniferm NS **TD**

Bioprotection and sensory enhancement

Increases the varietal character and presents an elevated capacity for bioprotection, thanks to its rapid implantation and low latency period.

viniferm NS **CHANCE**

Biotechnology in the face of climate change

Elevated acidification power, making it possible to control the pH and increases the complexity of the wines.

Bioprotection and sensory enhancement

The varietal aromatic expression is linked to the presence of varietal thiols, beyond the so-called thiolic varieties (Sauvignon Blanc, Verdejo), which contribute to the varietal character in wines of all grape varieties, both white and red.

The 4MMP, 3MH and 3MHA varietal thiols (currently called 4MSP, 3SH and 3SHA) are decisive aromas in white and red wines, because, despite their low concentration in the wine, they have a low threshold of sensory perception. In grapes, these thiols exist conjugated to amino acids, in a non-odorant form. Viniferm NSTD is able to cleave these precursors thanks to its β -lyase activity and release the corresponding volatile thiols.

In addition, due to its rapid implantation and during the latency period, Viniferm NSTD is considered a high-capacity bio-protection yeast.

viniferm ^{NS}TD

Non-Saccharomyces yeast of the species *Torulaspora delbrueckii* selected for its high β -lyase activity and its bioprotective character.

Oenological benefits



Enhances the varietal character and complexity of wines



Reduces alcohol levels



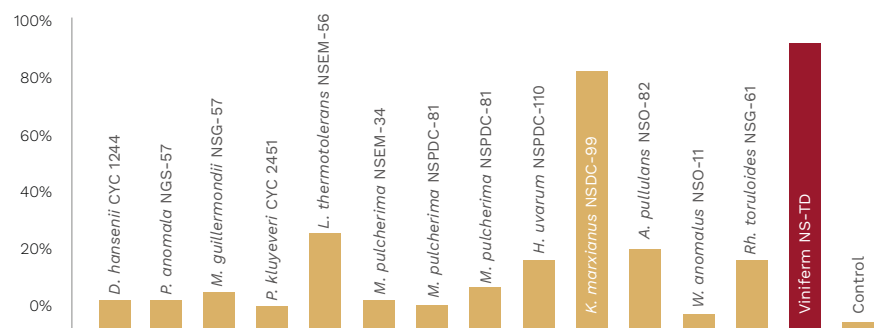
Reduces the risk of organoleptic deviations during the first stages of fermentation, thanks to its bioprotective nature



Improves tactile sensations of the wines

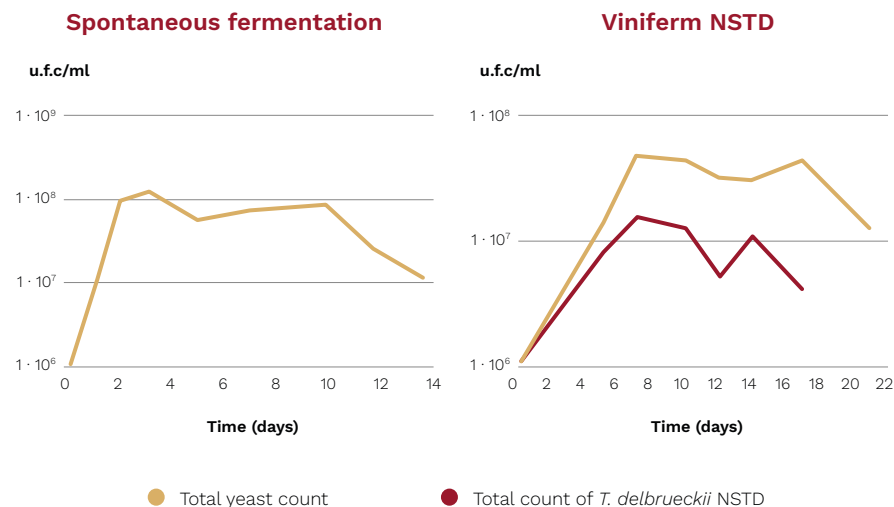
Selection of Viniferm NSTD

After studying different species of *non-Saccharomyces* yeast strains, the Agrovin Group technical department identified that *Torulaspora delbrueckii*, and in particular, the Viniferm NSTD strain, has high β -lyase activity. But it was not selected only for this. It also improves the tactile sensations of wines through the formation of glycerol and the release of mannoproteins, reducing the alcoholic degree of wines and producing significantly lower amounts of acetic acid than *S. cerevisiae*, due to its ability to slowly ferment sugars.



B-lyase activity of different *non-Saccharomyces* yeasts. Different strains of the same species show different β -liasa enzyme activity. Note the β -liasa activity of the Viniferm NSTD strain.

Viniferm NSTD has a good bioprotective character as it has a high implantation capacity even at low temperatures.



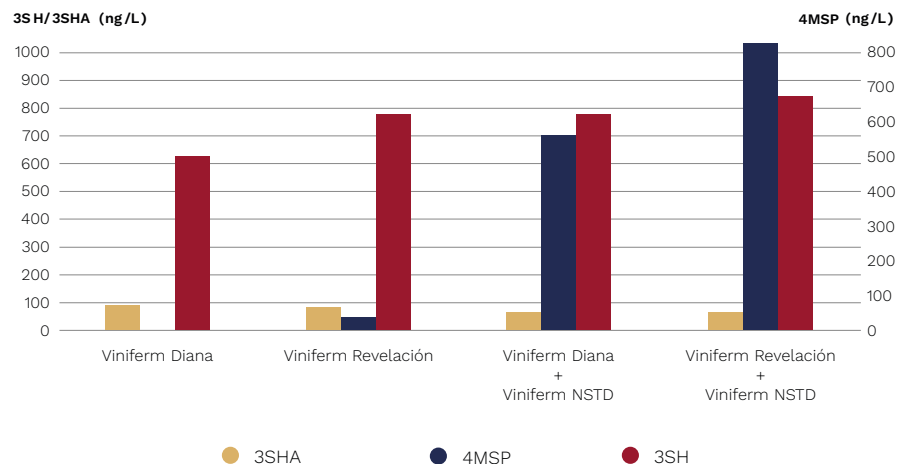
Comparison of the yeast population in spontaneous fermentations versus the use of Viniferm NSTD

Viniferm NSTD has been observed to quickly, thus avoiding the multiplication of other yeasts, thanks to its great bioprotective effect. We can see how fermentation time lengthens up to 22 days.

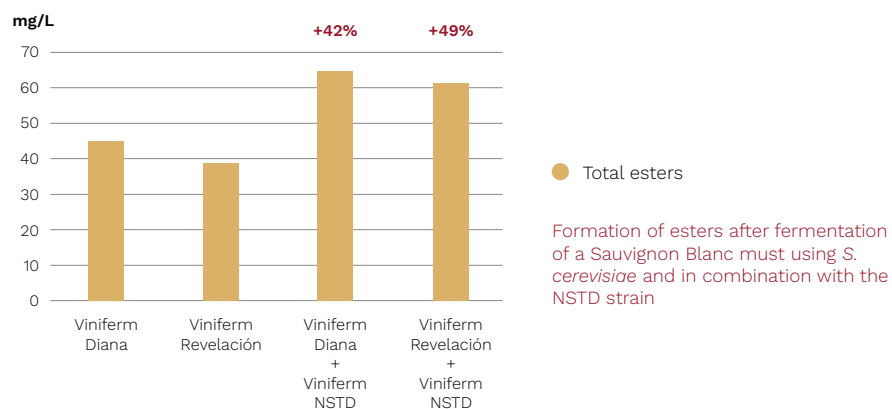
- Fermentative power**
Average (<12 % vol.)
- Working temperature**
16-25°C
- Nutritional needs**
Average (organic nitrogen)
- Alcoholic yield**
Low
- Sulphur resistance**
Moderate (<30 ppm)
- Volatile Acidity Production**
Very low

Viniferm NSTD Results

Enhances the varietal character and complexity

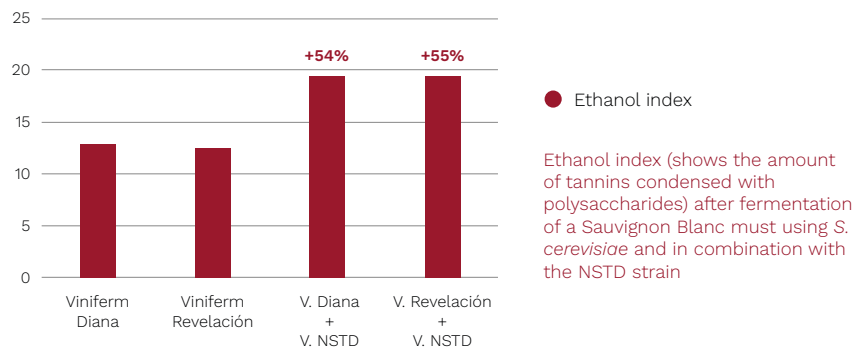
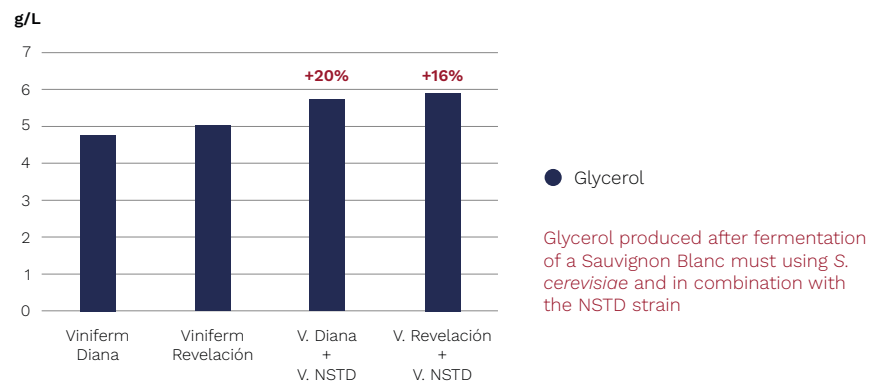


Concentration of thiols, 3MH and 4MMP (ng/L), after fermentation of a Sauvignon Blanc must using *S. cerevisiae* and in combination with the NSTD strain.

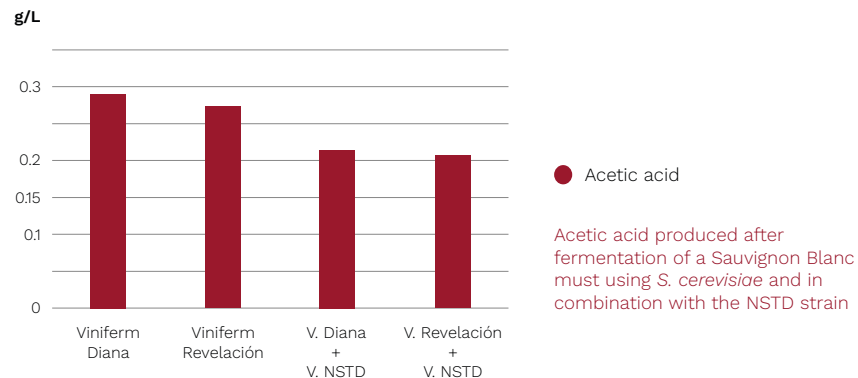
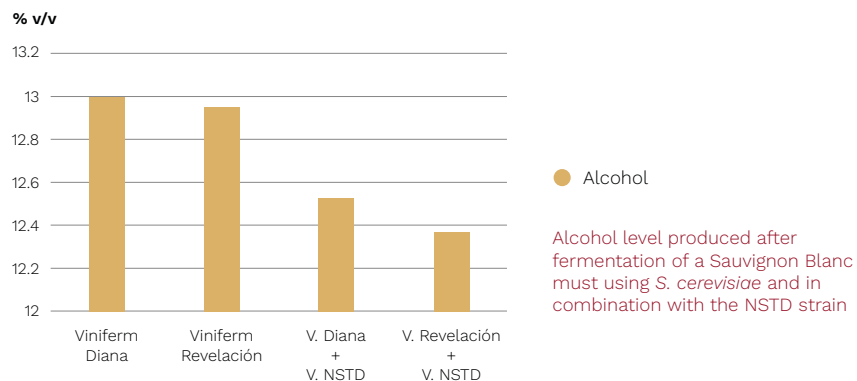


Formation of esters after fermentation of a Sauvignon Blanc must using *S. cerevisiae* and in combination with the NSTD strain

Improvement of tactile sensations



Reduction of the alcohol levels and production of acetic acid



Conclusions

The use of Viniferm NS TD during production not only gives rise to more complex wines with a strong varietal character, but Viniferm NS TD will exert an important bioprotective character that will reduce the risk of organoleptic deviations during fermentation.



Mode of use

Use of Viniferm NSTD with bioprotective character

Apply by sprinkling in a hopper at the following doses: **20-30g/hl.**

Use of Viniferm NSTD to improve sensory effects in fermentation at temperatures below 18° C

Apply in tank after rehydration at a dose of **20-30g/hl.** Inoculate *Sacharomyces cerevisiae* in co-inoculation.

Use of Viniferm NSTD to improve sensory effects in fermentation at temperatures greater than 18° C

Apply in tank after rehydration at a dose of **20-30g/hl.** Inoculate *Sacharomyces cerevisiae* when the must has reached around 4° Alc.

Biotechnology in the face of climate change

The Agrovín Group developed a new, natural, sustainable and ecological strategy to try to combat the increasing pH of wines caused by climate change. *Lachancea thermotolerans* is a *non-Saccharomyces* yeast of high oenological interest due to its ability to produce lactic acid. It makes it possible to control the pH of the wine/must, while also increasing the complexity of the wines due to the production of relevant amounts of glycerol and 2-phenyl -ethanol.

viniferm NS CHANCE

Non-Saccharomyces yeast of the species *Lachancea thermotolerans* selected for its high lactic acid synthesis capacity. Viniferm NS CHANCE was created several years ago in research together with the Complutense University of Madrid under the LOWpHWINE research project.



Oenological benefits



Elevated acidification power



Favors smoothness, formation of glycerol



Increase in wine complexity



Low volatile acidity production

Selection of Viniferm NS CHANCE

Strains of *Lachancea thermotolerans*

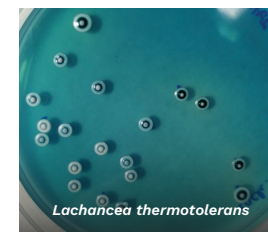
For the selection of Viniferm NS CHANCE, more than 30 different strains were studied to find the strain with the greatest acidification power and good aptitude for winemaking.

Fermenting conditions

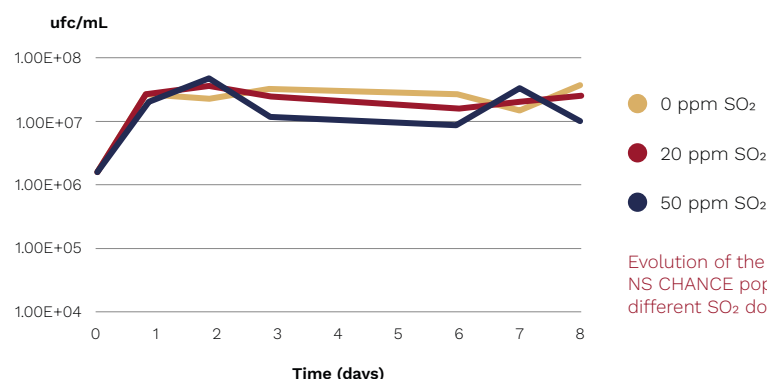
Fermentations were carried out in white and red musts with different GAP and at different temperatures (14, 18, 22 °C).

Selection criteria

- Rapid good implantation
- Elevated lactic acid production
- Low volatile acidity production
- Sulphur resistance.



Growth of *Lachancea* colonies in bromocresol YMA-green medium



Evolution of the Viniferm NS CHANCE population at different SO₂ doses

— **Fermentative power**
Average (<10 % vol.)

— **Alcoholic yield**
Low

— **Working temperature**
16-25°C

— **Sulphur resistance**
Moderate (<30 ppm)

— **Nutritional needs**
Average (organic nitrogen)

— **Volatile Acidity Production**
Low

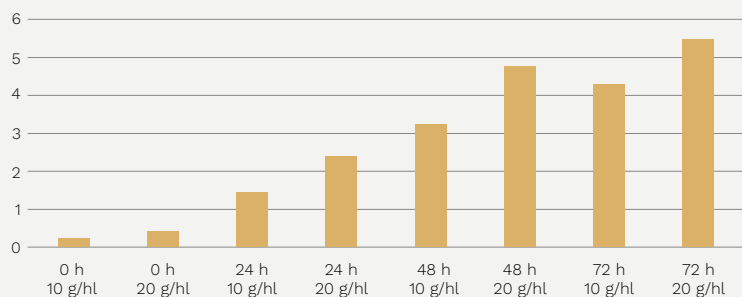


Mode of use

The species *Lachancea thermotolerans* has a moderate fermentative power, so the production of wines with this yeast must use sequential fermentation with *Saccharomyces cerevisiae*.

The doses of Viniferm NS CHANCE inoculum and the time of addition of the yeast *Saccharomyces cerevisiae* will be fundamental in the formation of lactic acid.

Lactic acid (g/L)



Lactic acid content in wines obtained with different addition doses of the addition of Viniferm NS CHANCE and inoculation of *S. cerevisiae* at different times. The graph indicates the moment in which the yeast *Saccharomyces cerevisiae* is inoculated

Lactic acid Production	Dosis de Viniferm NS CHANCE	Time of inoculation of <i>S. Cerevisiae</i>
0 - 1.5 g/l	10 g/hl	24 hours
1.5 - 3 g/l	20 g/hl	24 hours

*Concentrations of lactic acid greater than 2 g/l can inhibit malolactic fermentation.

Viniferm NS CHANCE Results

Comparative test of sequential fermentation with Viniferm NS CHANCE and *Saccharomyces cerevisiae* from the Viniferm range against a control fermented only with *Saccharomyces cerevisiae* from the Viniferm range.

	Control	Inoculation with <i>S. Cerevisiae</i> (24 hours)	
Viniferm Dose NS CHANCE	-	10g/hl	20g/hl
% v/v	13	12.87	12.77
Acetaldehyde (g/l)	36	33	23
Glycerol (g/l)	6.88	7.73	7.88
Free SO ₂ (mg/l)	3	2	3
Total SO ₂ (mg/l)	28	23	18
pH	3.37	3.24	3.19
Total acidity (g/l)	6.62	7.33	7.78
G+F (g/l)	0.25	0.31	0.17
Lactic acid (g/L)	0.59	1.38	2.68
Acetic acid (g/L)	0.36	0.32	0.30

Conclusions

The use of Viniferm NS CHANCE solves the problem of the loss of acidity in wines generated by climate change. It favors the development of longer-lived, complex and unctuous wines, thanks to the formation of glycerol.

02

Direct addition yeast



viniferm *Direct*

Viniferm 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**.

Characteristics / Oenological benefits

- 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.

Advantages of the Agrovin direct addition solutions



Direct application in the must



Energy savings and water consumption



Simplifies winery operations



Time savings



Ease of use



Safe application

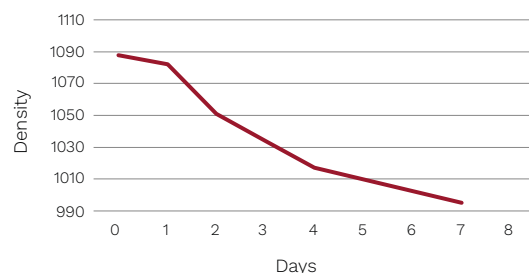
Organoleptic profile

Suitable for red wines where the goal is to enhance the varietal profile.



Fermentation kinetics

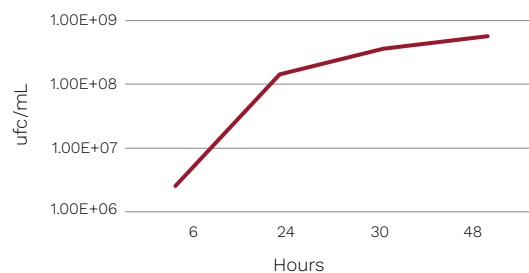
Viniferm Direct implantation is 100% in the determination carried out below density 1040.



Study of a must after addition of Viniferm Direct at a temperature of 20°C.

Yeast population

Reaches optimal yeast populations for fermentation



Study of a must after addition of Viniferm Direct at a temperature of 20°C.



Mode of use

01 Sprinkle the yeast at a dose of 30 g/hl

- a- Over the top of the tank during pumpover.
- b- Over a fraction of the must and incorporate into the deposit (20')

02 Carry out an open pump-over for 20-30 minutes to allow for its homogenisation

03 Carry out an adequate nutritional protocol

YAN < 180 mg/l → Adjust YAN to values of 180 mg/l with **Actimax Varietal** or **Actimax Natura** during the addition of **Viniferm Direct**.

YAN ≥ 180 mg/l → Add 30 g/hl of **Actimax Regrowth** after 48 h of adding **Viniferm Direct**.

Improved results combined with:

Actimax *Regrowth*

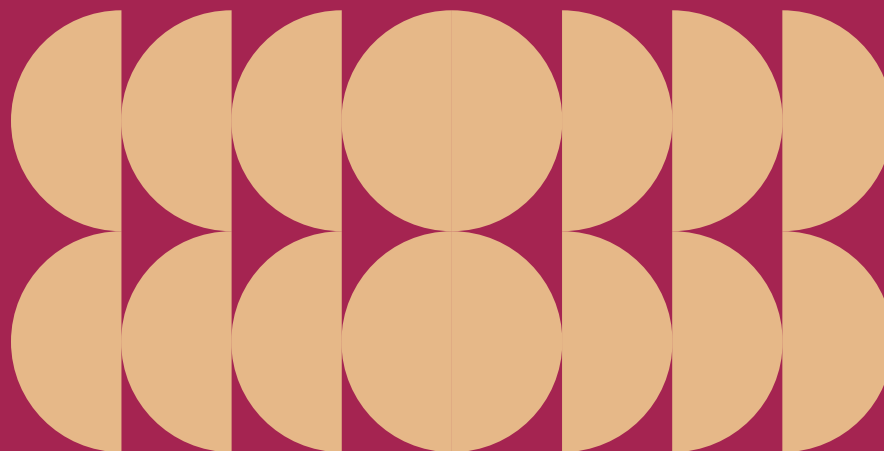
Safety and viability during yeast multiplication

Complex nutrient that combines nitrogen sources with growth factors and fungal chitosan to reduce populations of contaminating microorganisms.



03

Natural clarification of wines



In recent years, the market trend has been heading towards the use of sustainable and natural oenological solutions. In the case of oenological fining agents, different alternatives have been developed to reduce the use of proteins from the animal kingdom. Consequently, fining agents have been developed from peas and potatoes.

At the Agrovin Group, in order to expand the line of alternative products to animal proteins, a fining agent based on yeast protein has been selected for refining wines.

Clarifine Proyeast

Clarifine ProYeast is a fining agent based on ***Saccharomyces cerevisiae*** yeast protein extract. Its respectful extraction process makes it possible to obtain a yeast protein with a molecular weight greater than 15 kDa and with an excellent fining capacity, ideal for subtle clarifications of white, rosé and red wines.

Oenological benefits



Promotes the elimination of oxidized and oxidizable polyphenols, protecting the wine from oxidation, allowing for browning and aromatic loss.



Respectfully refined, eliminating the most astringent tannins, improving smoothness and respecting the structure of the wine.



Improved sensory characteristics. Wines with greater aromatic frankness are obtained after clarification with Clarifine ProYeast.

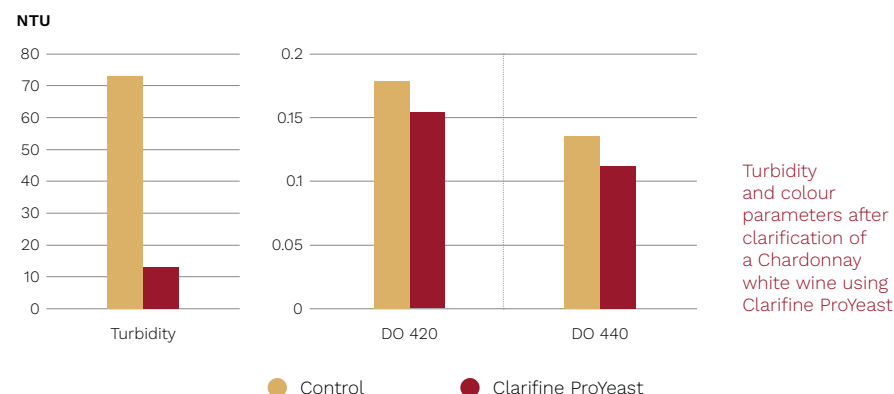


Its excellent fining capacity favors the cleanliness of wines, also increasing their brilliance.

Respectful clarifications

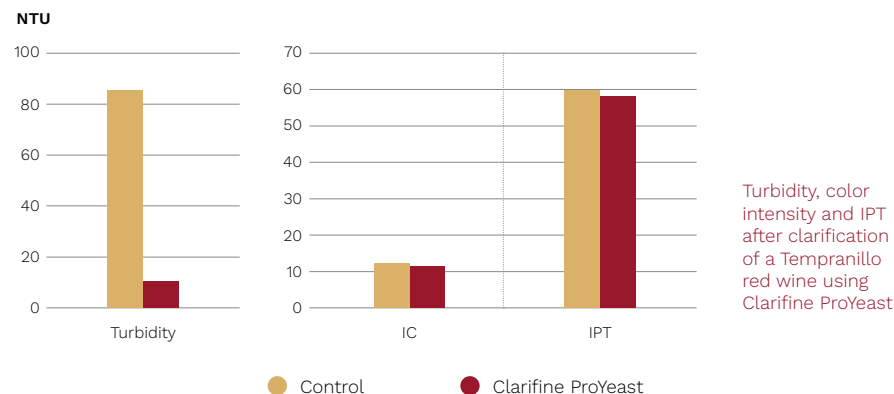
Results in white wine

The use of Clarifine ProYeast in white wine clarification gives rise to clean, bright wines with better colour parameters (DO 420 nm and DO 440 nm).



Results in red wine

Clarifine ProYeast is a very respectful clarifying agent thanks to its high selectivity. In the clarification of red wines, ProYeast causes rapid cleaning, respecting their color (IC) and structure (IPT), only eliminating the most astringent tannins.



Dose and mode of use

01 Dilute the necessary quantity of Clarifine ProYeast in water at a ratio of 1:10 and homogenise

02 Once dissolved, add to the total volume and homogenise by pumping over

*To improve flocculation, in white and rosé wines, it is recommended to add fining aids such as bentonite, silica sol or tannin.

Conclusions

Clarifine ProYeast is an organic, vegan and allergen-free protein, ideal for its application in the subtle clarification of white, rosé and red wines. Due to its high selectivity, it fully respects the organoleptic characteristics of the wine.



04

Great alternative to SO₂ usage



The use of sulfur is nowadays intensive in wineries, but consumers are increasingly demanding wines with low sulfur content. Organic wine regulations and the irritant capacity of sulfur dioxide, together with the negative effects on the health of sensitive consumers, have led wineries to consider strategies to reduce its use.

Agrovin therefore have developed Microstab Protect, a solution suitable for organic wines, effective against oxidation and microorganism populations.

MICROSTAB PROTECT

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

Oenological benefits

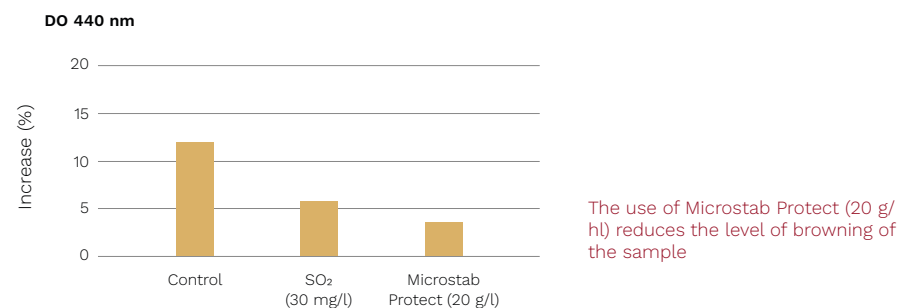
Microstab PROTECT can be used at any moment during the winemaking process as a substitute of, or in addition to, sulphur dioxide.

- 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).

Reduction of microorganisms and antioxidant protection

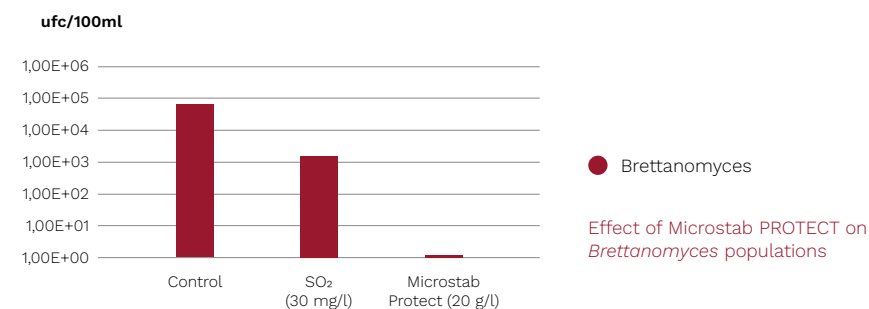
Antioxidant effect

Due to its high glutathione content, combined with the antioxidant effect of the gallic tannin, Mictostab Protect renders better results than when using glutathione alone.



Antimicrobial effect

The antimicrobial effect is beneficial against Brett. Populations can be controlled without the addition of sulfur 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.
- **SO₂ - free wines.**
Complete alternative to the use of sulphur dioxide.
- **Reducing SO₂.**
- **Brett control.**
- **Reinforcing antioxidant protection.**
- **Delaying or controlling MLF.**
- **Reducing oxidation.**

Calculations and conversions charts

Temperature conversions

°F	0	32	40	50	60	70	80	90
°C	-18	0	4	10	16	21	27	32
$^{\circ}\text{F} = (^{\circ}\text{C} \times 9/5) + 32$								

Acids

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

Equivalent Units

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

Dosage

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

Supplemental technical information of products is available online at www.agrovin.com

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