

2016
INNOVATION



Selected in collaboration with  INRA
SCIENCE & IMPACT

More acidity,
more balance !



www.lallemandwine.com

LALLEMAND

Acids are very important structural components of wine. If a wine is too low in acid, it tastes flat and dull. If a wine is too high in acid, it tastes too tart and sour. Usually, the winemaker can easily manipulate the acidity.

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Acidity in Wine

Total acidity (TA) of a wine allows the determination of a value for acidity that is consistent to predict wine tasting and possible issues, such as infection by spoilage microorganisms. Most red table wines are about 0.6% total acidity while white wines are usually a little higher.

Although total acidity and pH are related, they represent different ways of measuring acidity of wine. If the pH of a wine is too high, 4.0 or above, the wine becomes unstable with respect to microorganisms.

Low pH inhibits microorganism growth. Tartaric acid is often added to fermenting grape juice during winemaking process to ensure that an acceptable final pH can be realized, as some acid is lost during fermentation, thus reducing the total acidity and raising the pH.

Link between acidity and alcohol in Wine

With climate change, wine acidity levels are decreasing and alcohol levels are increasing.

Wine with more alcohol and less acidity will not have the ability to age as well as in the past.

The winemaker can intervene on canopy management and or in the cellar using equipment to control these two parameters in pre and post fermentation. However, these practices are often costly and are not always completely satisfactory.

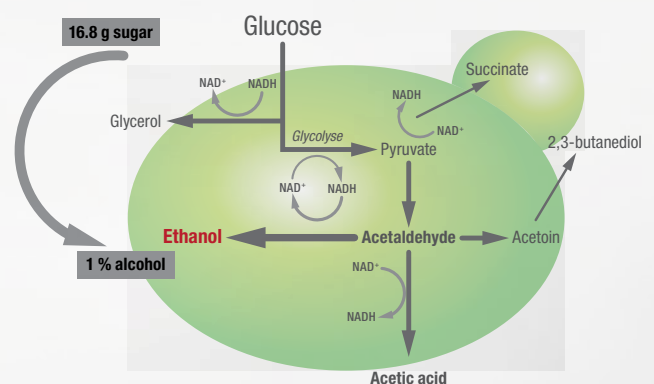
pH and acidity during alcoholic fermentation and yeast metabolism

During alcoholic fermentation, there can be an overall decrease in total acidity particularly because of tartaric acid crystallization.

With the production of ethanol and to maintain intracellular pH and optimize its metabolism, the yeast will excrete protons into the media, which will impact pH.

In addition, there is an increase in biomass and synthesis of other metabolites such as organic acids (succinate) which will also impact on the pH.

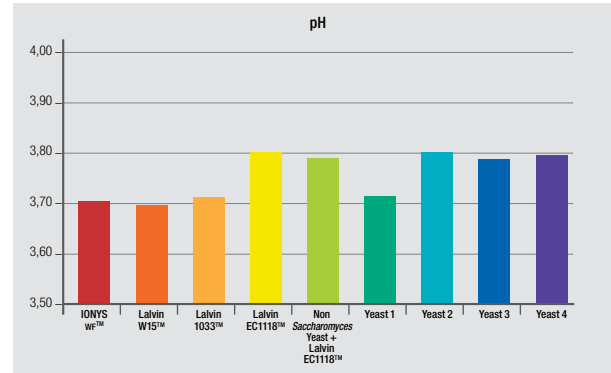
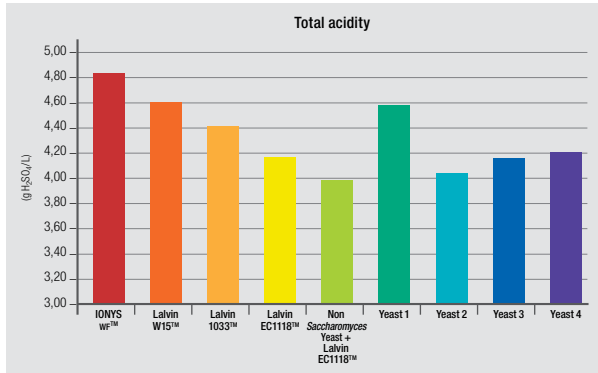
Wine yeast metabolism: intracellular redox balance



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IONYS^{WF}™ : A yeast solution to keep must acidity during fermentation

IONYS^{WF}™ is the first wine yeast that has been selected within the *Saccharomyces cerevisiae* species for its capacity to significantly and naturally acidify must during fermentation.



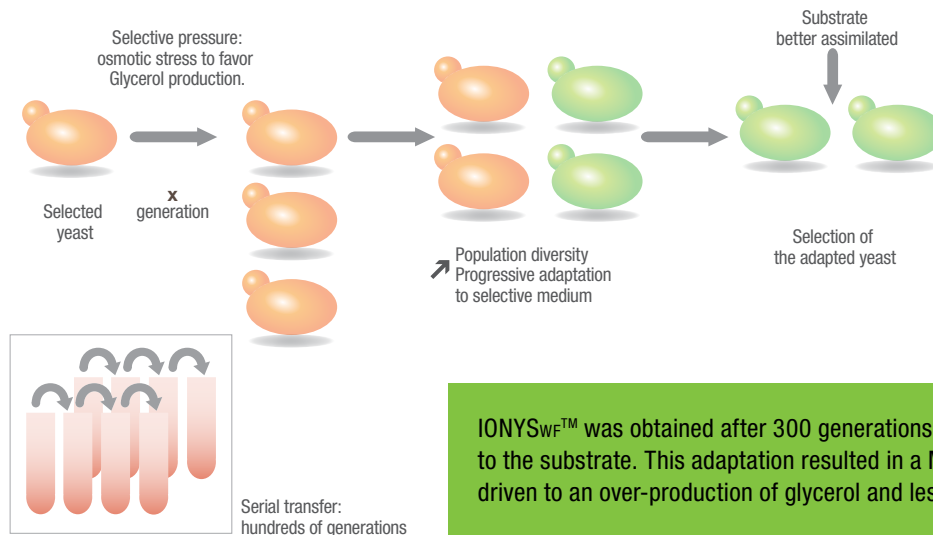
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Why IONYS^{WF}™ is so unique?

IONYS^{WF}™ is the result of a common research project between Lallemand and INRA Montpellier, France (*Institut National de la Recherche Agronomique*). The aim of this collaboration was to select a wine yeast better adapted to the global warming conditions. The strategy used, called “adaptive evolution”, allows to generate yeast progressively adapted to these high osmotic pressure conditions. The goal was to select yeast over-producing glycerol and exhibiting a higher sugar to ethanol conversion rate.

Tilloy V; (April 2013) *Développement de nouvelles souches de levures œnologiques à faible rendement en éthanol par évolution adaptative*. Thèse Montpellier SupAgro.

ADAPTIVE EVOLUTION: PRINCIPLE



IONYS^{WF}™ was obtained after 300 generations adapted to the substrate. This adaptation resulted in a Metabolism driven to an over-production of glycerol and less alcohol.

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Results

A *Saccharomyces cerevisiae* yeast with a very special and unique metabolism over-producing glycerol and **organic acids**.

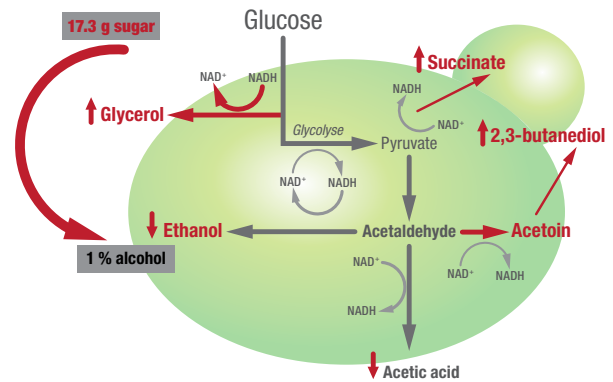
While most of the wine yeasts will need to consume 16,8 g of sugar to produce 1% of alcohol, IONYS_{WF}TM will need to consume 17,3 g to produce 1% of alcohol. This particular metabolism makes it especially adapted to ferment high maturity grape must.

IONYS_{WF}TM is an innovative yeast selection: International Patent Pending N° W02015/11411.

DEQUIN Sylvie, TILLOY Valentin, ORTIZ-JULIEN Anne, NOBLE Jessica.

Method for obtaining low ethanol-producing yeast strains, yeast strains obtained therefrom and their use.

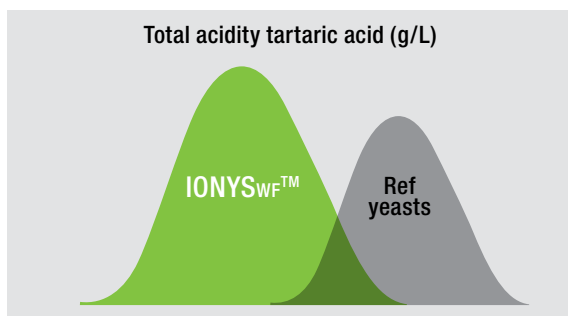
A special and particular metabolism: IONYS_{WF}TM



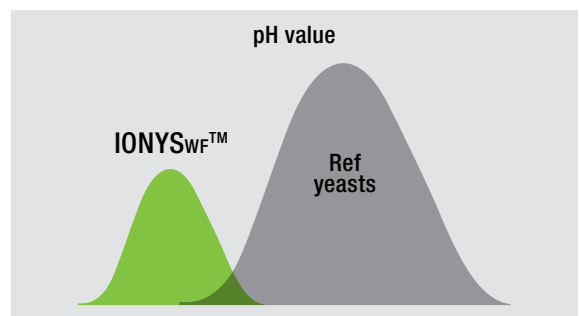
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Evidence

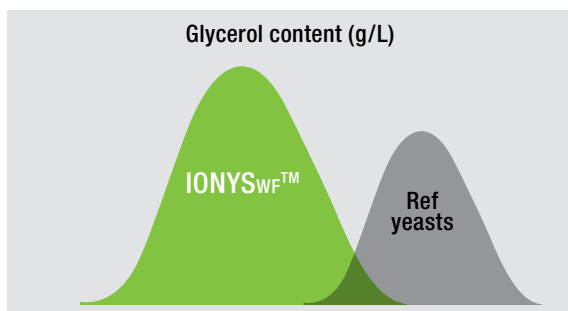
Average values results from over 30 wineries trials conducted with IONYS_{WF}TM Vs other commercial wine yeasts under the same conditions.



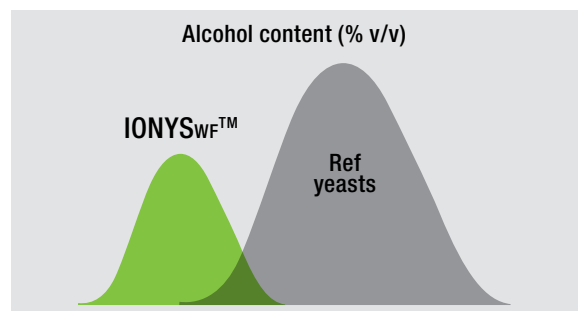
Total acidity difference observed: +0.4 to 1.4 g/L tartaric acid



pH difference value observed: -0.04 to -0.2



Glycerol Over production observed (17 g/L vs 8 g/L for the reference yeast)



Alcohol difference observed: 0.4 to 0.8 % v/v

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IONYSTM_{WF} : For acidity and balance in reds

Adapted to red wine fermentation, IONYS_{WF}TM is an essential tool to obtain wines with more balance and freshness.

- High acidification power:
Total acidity difference:
+0.4 to 1.4 g/L tartaric acid /
pH decrease: 0.04 to 0.2
- High glycerol production
(up to 15 g/L)
- Low alcohol producer (0.4 - 0.8 % v/v
under winery conditions v's other
commercial wine yeasts used
under the same conditions)
- Very low volatile
acidity production
- Very low SO₂ and H₂S
production
- Ethanol tolerance:
16% alcohol
- Nitrogen requirements:
Very high (appropriate
nutrition is required)
- Long but steady stationary
phase
- Optimum range of T° :
25 to 28°C



Protection of this yeast product by international patent pending
WO2015/11411 - all reproduction or propagation is strictly prohibited.



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How to use IONYSTM_{WF} ?

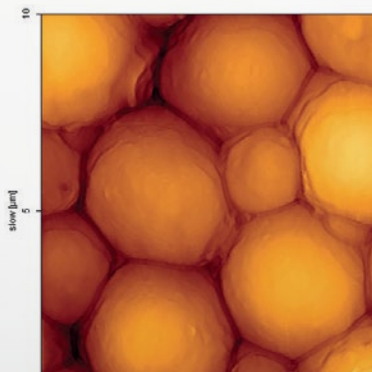
Instruction for use

Highly recommended to inoculate IONYS_{WF}TM as soon as rehydration is finished to ensure a good implementation.

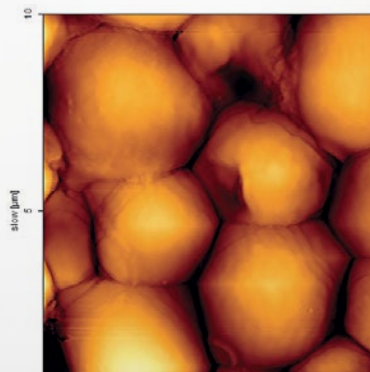
At fruit reception, SO₂ level should be ≤ 4 g/hL (40 ppm total SO₂).

In high maturity conditions (high potential alcohol) in order to protect yeast against osmotic shock, the usage of GO-FERM PROTECT EVOLUTIONTM (30 g/hL) is highly recommended during the yeast rehydration phase.

- 1** Suspend 30 g/hL of GO-FERM PROTECT EVOLUTIONTM in 20 times its weight of clean 43°C water.
- 2** Once the temperature of the GO-FERM PROTECT EVOLUTIONTM solution has dropped to 40°C, add 25 g/hL of IONYS_{WF}TM. Stir gently and wait for 20 minutes.
- 3** Add to the must. The temperature difference between the must to be inoculated and the rehydration medium should never be more than 10°C (if any doubt, please contact your supplier or Lallemand).
- 4** The total rehydration duration should never exceed 45 minutes.
- 5** It is essential to rehydrate the yeast in a clean container.
- 6** The rehydration in must is not advisable



With GO-FERM PROTECT EVOLUTIONTM



Without GO-FERM PROTECT EVOLUTIONTM

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Nutrition is a key point when using IONYSTM_{WF}

Well-balanced nutrition is of primary importance to the wine yeast during fermentation (Fermaid OTM is the latest nutrient developed by our winemaking nutrient research team).

- 1- First addition of Fermaid OTM at the end of the lag phase
- 2- Second addition of Fermaid OTM around 1/3 sugar depletion (the end of exponential growth and the beginning of the stationary phase)

Note: In conditions of nitrogen deficiency, yeast assimilable nitrogen may be insufficient to avoid fermentation issues. Refer to the following recommendations table chart.

Yeast assimilable Nitrogen (mg/L)	First addition	Second addition at 1/3 of AF
> 140	Fermaid O TM 20 g/hL	Fermaid O TM 20 g/hL
< 140	Fermaid O TM 30 g/hL	Fermaid K TM 25 g/hL

FAQ

Why is IONYS_{WF}TM producing more total acidity?

Initially, this yeast was selected for its ability to overproduce glycerol. In the yeast cell, and during glycerol synthesis, other intracellular pathways are overexpressed or on the contrary, can be repressed. This is how yeast naturally control their intracellular redox balance. Among the metabolites produced by this metabolism, some organic acids are overproduced such as succinic acid, pyruvate and malic acid.

During the selection process, the yeast has been adapted on a high specific medium which would mimic an osmotic stress to the cells and thus induce overproduction of glycerol. This adaptation mechanism leads the yeast to develop a specific metabolism towards this specific medium: the result is adapted cells that have the ability to naturally internalize potassium and by doing so, lower its content in the must in fermentation, avoiding precipitation with tartaric acid.

Is it A GMO?

No, it's a yeast selected through adaptive evolution, which is a natural process.

Could I Use it on White and Rosé?

Yes, but the optimal T° range for fermentation for this yeast is between 25 and 28°C. Optimal impact on alcohol decrease has been observed in this temperature range.

Any issue with MLF?

IONYS_{WF}TM is compatible with wine bacteria.

Is there a sensory impact from the organic acids and glycerol produced?

High glycerol level and organic acid production combined with the higher sugar conversion into alcohol all contribute to the volume perception in mouth, and balance the acidity with an overall freshness of the wine.

Does the behavior of yeast depend on the initial must acidity?

Even if IONYS_{WF}TM will maintain its ability to produce more organic acids, it is recommended for musts with pH>3.5 where this acidification is more interesting.

More acidity, more balance!

