



Institut Coopératif du Vin

* The **ICV Group** offers professional services and products for each stage of the winemaking process.

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www.icv.fr



** **Lallemand** is still the only major supplier of wine yeast or bacteria that is a primary producer of both and the company owes its success to its constant pursuit of excellence, flexibility, ongoing investments in research and development and a broad range of high quality products.

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*** **Montpellier SupAgro** offers a full range of training courses from Bachelor (professional) degree to PhD, as well as several excellent engineer training curricula.

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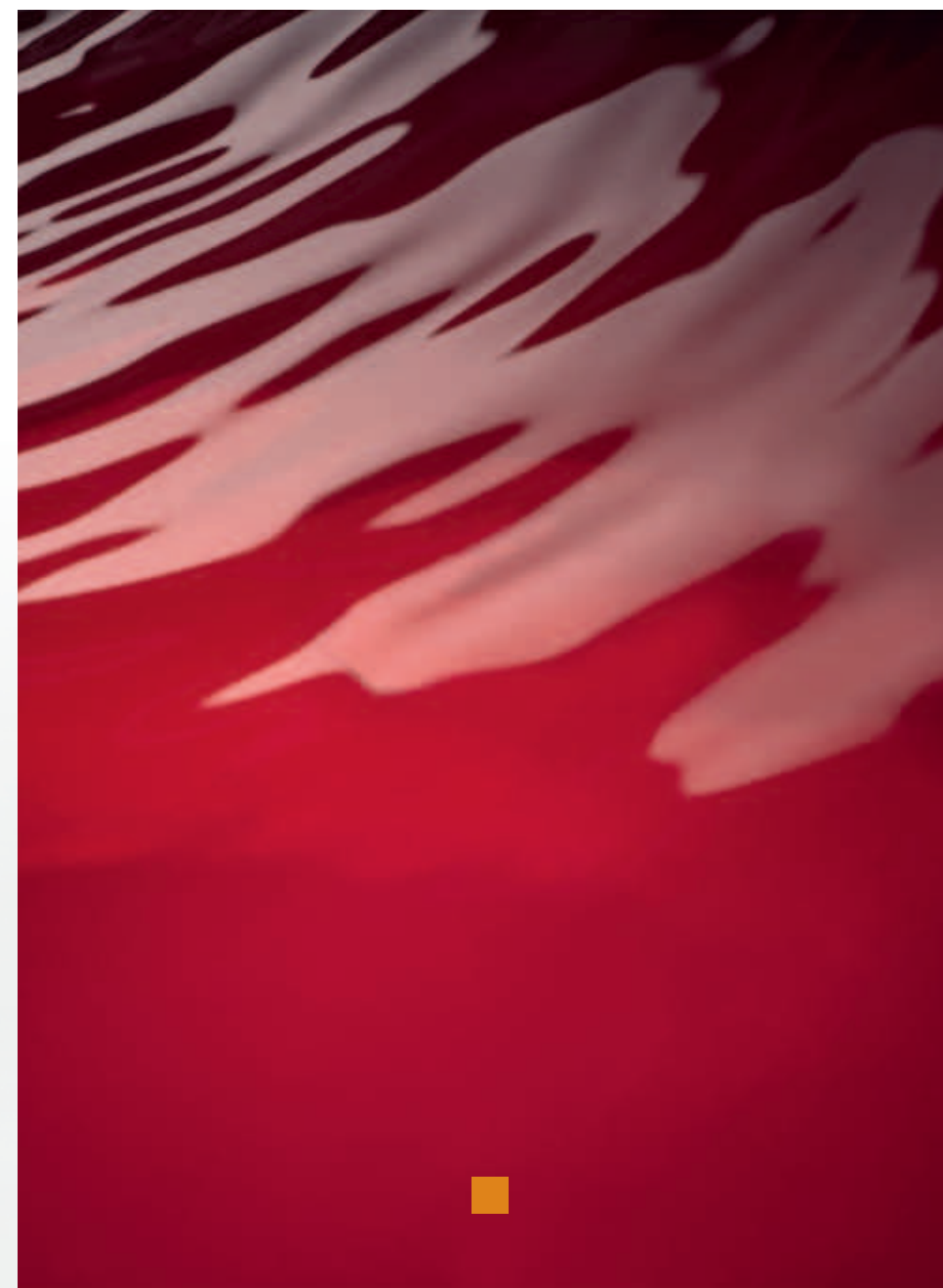
Institut National de la Recherche Agronomique

**** The French National Institute for Agricultural Research produces scientific knowledge and works for economic and social innovation in the areas of food, agriculture and the environment.

2, place Pierre Viala - 34000 MONTPELLIER (France)

www.montpellier.inra.fr

Nouveau Monde DDB Toulouse



Less SO₂, more aromas

LALVIN ICV **OKAY**®



Selected
in collaboration with



Do you know **LALVIN**ICV**OKAY**® ?

Lalvin ICV OKAY® is a real novelty for the winemaking industry that has been awarded in the category of Innovation SITEVI 2013.

Producing very low level of SO₂, negative sulfur compounds and acetaldehyde during alcoholic fermentation, **Lalvin ICV OKAY®** allows a better management of SO₂ for wine stabilization in accordance with market demand for having

wines with low level of sulfite. In addition of these particular characteristics, **Lalvin ICV OKAY®** is an excellent yeast fermentor with large enological conditions of usage. **Lalvin ICV OKAY®** is an innovative yeast selection (Patent pending PTC/IB220131050623) particularly interesting on white and rosé wines, ensuring low levels of volatile acidity. It brings freshness and balance in the mouth.

Do you know **LALVIN**ICV**OKAY**® effects

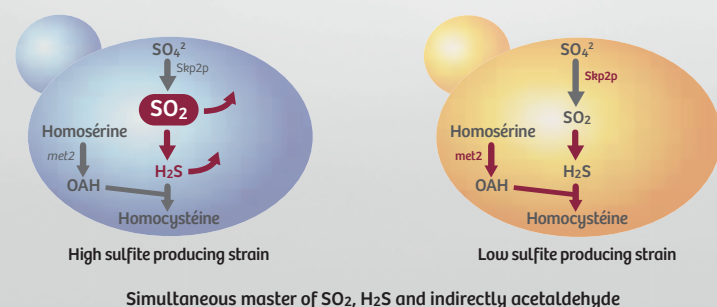
How does it work?

Saccharomyces cerevisiae yeasts in winemaking conditions spontaneously produce SO₂ during their fermentative activity. The level of production could be higher than 60 mg/L. This production depends on many environmental factors such as pH, temperature, grape variety... but it is also linked to the yeast strain genotype. **Lalvin ICV OKAY®** has been especially selected for its very low production of SO₂ with the security to complete alcoholic fermentation in a large range of winemaking conditions. This mechanism allowing the yeast to produce low level of SO₂ is also linked to H₂S lower production: an advantage to manage negative compounds during winemaking process.

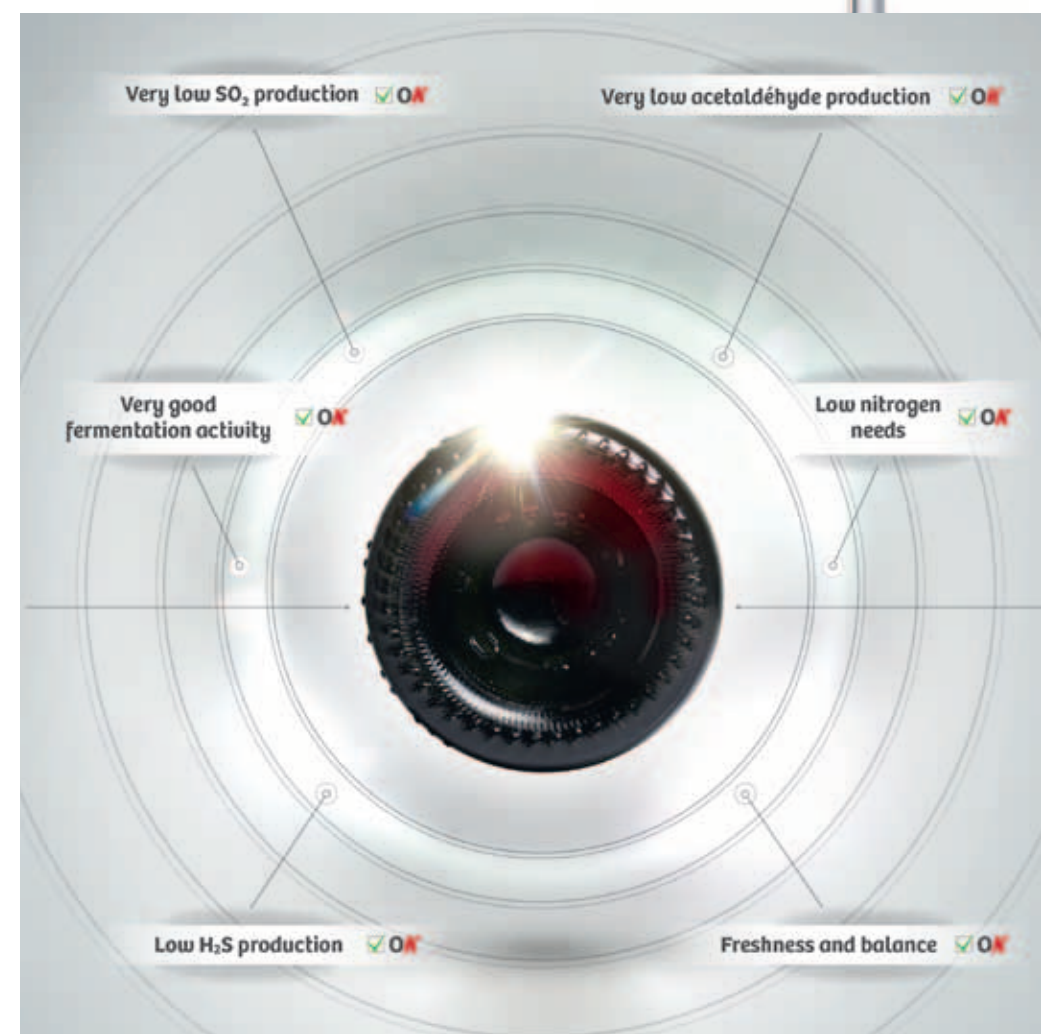
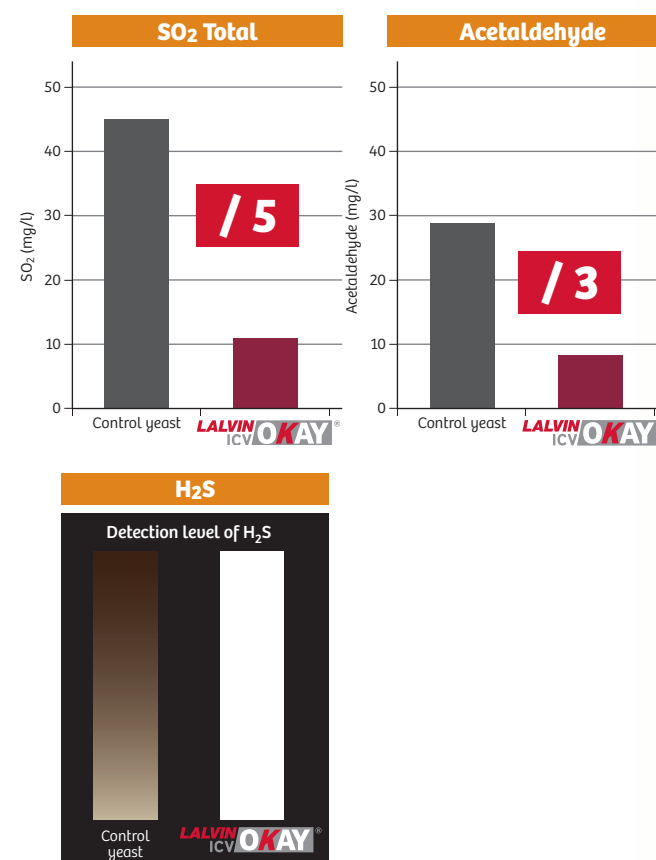
Mechanism of action

The SO₂ can be used or synthesized by the yeast during the fermentation, depending on the strain, the temperature and must content. H₂S can be formed by some strains as well, linked to SO₂ level.

In general, there is an unbalance between the production and the incorporation of sulfur compounds by the yeasts; whereas **Lalvin ICV OKAY®** gets an over expression of two genes allowing the equilibrium between incorporation and production of sulfur compounds. Consequently, there is no excess production and no release of SO₂ and H₂S within an indirect decrease of acetaldehyde.



Do you know **LALVIN**ICV**OKAY**® performances?



Why Lallemand and ICV[®] were interested in SO₂ production?

Most of winemakers are looking for reducing sulfite concentration in their wines in order to respond to market demand but also for regulation concern (for example for organic wine). Even if SO₂ addition

could be reduced, most of the yeasts produce it during fermentation. So, the usage of yeasts no producing SO₂ remains an important tool in order to manage these concentrations.

Management and origin of sulfur compounds

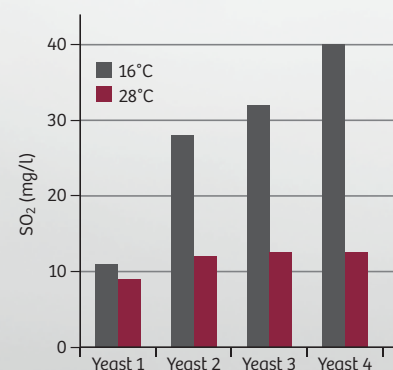
Sulfur compounds have several origins in winemaking. They can depend on the grape variety but also result from fermentation process.

When there are coming from alcoholic fermentation, sulfur compounds result from yeast sulfate pathway.

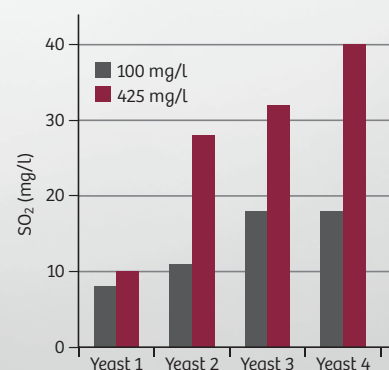
The yeast consumes sulfate (SO₄), sulfur dioxide (SO₂) and other cysteinylated precursors from which it synthesizes two essential amino acids (methionin and cysteine). During the metabolism of sulfur, the yeast releases sulfur dioxide and H₂S in the medium.

The parameters influencing the production of sulfur compounds by yeast are:

- 1. The strain:** first parameter since each yeast has its own metabolism and different ways of reacting to stress.
- 2. Temperature:** it has been shown that at low temperature (16 °C), sulfur production was greater than 28° C for example.
- 3. Nitrogen level in the must:** more the must contains nitrogen, more it will produce SO₂.



SO₂ production by different yeasts depending on the temperature



SO₂ production by different yeasts depending on the nitrogen level in the must

Market Trends

The major drawback of the SO₂ is its effect on human health. In some conditions, SO₂ has health negative impacts, destroying part of B1 vitamin and may gives allergenic reactions that affect blood circulation, respiratory system and generates headache. World Health Organization has determined a daily admissible dosage of 0.7mg/kg/day. Therefore, The European Union has determined legal level total SO₂ in wine at the market stage.

Appellations and organic wines have special rules with maximum total SO₂ level at the certification stage.

On the other hand, the market trend is more and more oriented to fresh and aromatic wines. Sulfur off-flavours are important in wine sensory profile, and may also change negatively the mouthfeel. Therefore, SO₂ management in winemaking opens door to improve wine aromas expression.

Legislation

Since 2005, the regulation obliges wine producers to mention sulfite presence on wine bottle label when it's over **10 mg/L**.

Without giving any clear indication regarding sulfite concentration, the practices in "organic wine" production give assurance to consumers that the wines are produced with a moderate use of added sulfur.

Research & Development

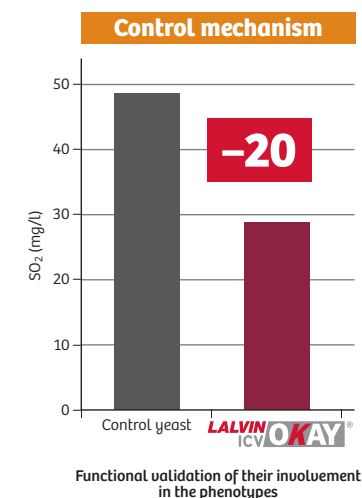
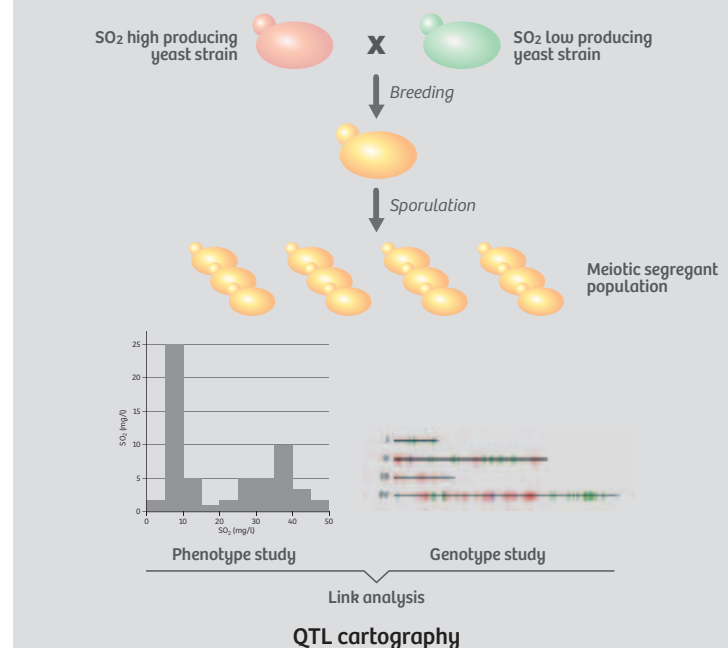
Lalvin ICV OKAY® is the result of a collaborative study between ICV® Group*, the company Lallemant, SupAgro*** and INRA**** Montpellier.**

The aim of this collaboration was to study the molecular basis of technological properties of wine yeast using QTL technology (Quantitative Trait Loci) during a PhD thesis : *Molecular basis study of technological properties of wine yeast (2011).*

Lalvin ICV OKAY® was selected by combining the traditional selection techniques and the QTL technology that

identifies regions of the genome involved in function of interest. The innovation is based on successive backcrosses between particularly efficient yeast from an oenological point of view and a yeast with specific genetic characteristics (very low ability to produce sulfur compounds). This resulting yeast combines robustness characters (Killer K2, phase short latency, ability to ferment at more than 30 °C, ability to ferment musts over 15.5% potential alcohol...) and very low production of SO₂, H₂S and acetaldehyde. These latter characteristics help to lower the uses of SO₂ during winemaking.

A quantitative genetic approach to identify the genes involved



Perspectives

This innovative genetic approach will be applied in a next future to other wine yeast strains known for their interesting enological properties but which are producing significant levels of SO₂ and H₂S during fermentation.

This tool is effective to better understand yeasts properties and identify interesting genes. QTL process offers wide possibilities to improve characteristics of natural selected yeasts. Lallemant is already working on new strains breeding your favorite's with attractive traits!

QTL PROCESS Proceedings

The QTL technique is a process of quantitative genetics to identify genes involved in a particular phenotypic trait and locate in the yeast genome.

The method first involves crossing a high SO₂ producing strain with a low SO₂ producing strain. The generation of this crossing is then analyzed at the phenotypic level (amount of SO₂ produced by each individual) and genotypic level (mapping parental origin of the genome).

Thus two regions of the genome have been identified as being linked to the phenotype of production of SO₂, H₂S and acetaldehyde.

Once identified, the trait of interest is then transferred to a targeted strain, chosen for its fermentative capacity. This is done by repeating the crossing between the low SO₂ producing strain with the targeted strain.

To summarize, Lalvin ICV OKAY® is an innovative yeast selection (Patent pending PTC/IB220131050623) particularly interesting on white and rosé wines, ensuring low levels of volatile acidity and promoting aromatic esters. It brings freshness and balance in the mouth.

Bibliography

A QTL approach of the molecular basis of sulfite and sulfide production by wine yeasts: Jessica Berlese-Noble, Isabelle Sanchez, Anne Ortig-Julien, Bruno Blondin (5th PYFF, Montpellier, June 4th to 7th, 2013)

A new and powerful strategy to control SO₂ and H₂S production by wine yeast: Jessica Berlese-Noble, Anne Ortig-Julien, Bruno Blondin (ICY 2012; Madison; August 26th to 30th, 2012)

FAQ

Is Lalvin ICV OKAY® a GMO yeast?

It is not a GMO ; it has been selected among hybrid yeasts developed through back-crossing approach using the QTL process.

Do I have a risk to have less stable wines after using Lalvin ICV OKAY®?

No specific risk if good practices of SO₂ at the end of fermentation are followed. SO₂ produced by a yeast is combined and has no action regarding stability of the wines. Moreover, low acetaldehyde production can be beneficial for having a more efficient stabilization at the end of alcoholic fermentation.

Does Lalvin ICV OKAY® consume SO₂ during AF?

SO₂ is usually consumed by the *Saccharomyces* yeasts in the sulfate pathway. Lalvin ICV OKAY®, within its specific metabolism, uses directly SO₂ for the synthesis of the two sulfur essential amino acids avoiding the release of H₂S.

Is Lalvin ICV OKAY® able to dominate among wild yeasts, if no sulfite is added in the must?

Lalvin ICV OKAY® shows strong fermentative properties allowing a quick onset of fermentation, with a good multiplication during the exponential phase, avoiding the development of the indigenous flora.

Due to its low SO₂ production, does Lalvin ICV OKAY® favour malolactic fermentation, also in white wines where it is unwanted?

In general, Lalvin ICV OKAY® favors the malolactic fermentation. In the case of whites wines where the ML fermentation is unwanted, it is advised to follow deeply the final phase of fermentation and apply the good practices of SO₂ addition.