



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



Institut Coopératif du Vin The ICV Group offers professional services and products for each stage of the winemaking process. La Jasse de Maurin, 34970 Lattes, France www.icv.fr



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, 34060 Montpellier CEDEX 2, France www.montpellier.inra.fr



Montpellier SupAgro offers a full range of training courses from bachelor (professional) degrees to PhDs, as well as several excellent engineer training programs. Initial and continuing training, research, international scientific and technical cooperation, and development represent the main missions in the areas of agriculture, food, environment and rural territories. 2, place Pierre Viala, 34060 Montpellier CEDEX 2, France www.supagro.fr

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FAQ

Are these yeasts GMO yeast? No. These yeasts are hybrid yeast. They are not GMO.

Do I risk having less stable wines after using one of these yeasts? The SO₂ produced by yeast is normally bound, so there is no impact on the stability of the wines. The low acetaldehyde production can be beneficial, encouraging more efficient SO₂ binding at the end of alcoholic fermentation.

Do these yeasts consume SO₂ during alcoholic fermentation? SO₂ is usually consumed by *Saccharomyces* yeast through the sulphate pathway metabolism. The specific metabolism of these yeasts utilizes SO₂ directly to synthesize two essential amino acids containing sulphur, thus avoiding the release of H₂S.

Can these yeasts dominate wild yeasts when no sulphite is added to the must? These yeasts shows strong fermentative properties. Its quick onset of fermentation and good multiplication during the growth phase discourage the development of indigenous flora.

Due to its low SO₂ production, do these yeasts favor malolactic fermentation? They do favor MLF. In the case of wines where MLF is not wanted, the winemaker should closely monitor the final phase of alcoholic fermentation and apply good SO₂ practices to avoid MLF.

The selection of these yeasts was largely made possible through a collaborative study between the ICV Group, Lallemand Oenology, SupAgro and INRA Montpellier. This study, using the QTL technique (Quantitative Trait Locus), was used during the thesis: Identification of the molecular basis of technological properties of wine yeast (Jessica Noble, Advisor: Bruno Blondin, 2011). This work resulted in a patent application filed by INRA and Montpellier SupAgro: "Method of control on the production of sulfites, hydrogen sulfur and acetaldehyde by yeast (Variants MET₂ / SKP₂) "This approach has enabled the development of an innovative selection technique for yeast which produces low levels of S0₂, H₂S and acetaldehvde



LALLEMAND OENOLOGY

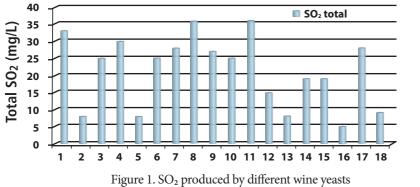
INTEGRATED SULPHUR MANAGEMENT





Consumer awareness of SO₂ content in wine, particularly since the label "Contains sulphites" is mandatory, has resulted in a trend toward reducing the addition rate of this compound. Reducing SO₂ content, both added and total residual dose, is now a serious technical and commercial issue for wine producers. Formation of compounds such as acetaldehyde (SO₂-binding), and H₂S (wine fault, rotten-egg aroma), are also a worrisome concern during winemaking.

Wine yeast are at the heart of the SO₂, acetaldehyde and H₂S production as they can be synthesized during fermentation. There is great variability in SO₂ produced by wine yeast during fermentation.(figure 1)



In a collaborative study we have identified the molecular basis of SO₂ production in yeast to eventually be able to reduce SO₂ production through the innovative QTL process. The QTL process involves identifying the genes for the desired trait (non-production of SO₂, acetaldehyde and H₂S) and naturally transferring it to another yeast chosen for its fermentation performance and other oenological qualities. Transferring the genes involved repeated crosses (backcrossing) between the low-SO₂ yeast and the target yeast. This is a non-GMO technique that can occur naturally in yeast. With this method, we obtained a yeast that produces very low to no concentrations of SO₂, H₂S and acetaldehyde.

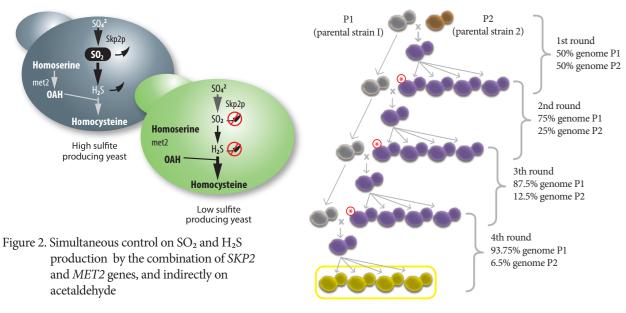


Figure 3. Yeast obtained with backcrossing, assisted by QTL markers

Looking to the future, the QTL innovative (and non-GMO) approach will be applied to other wine yeasts in our collection that are valued by winemakers for their enological properties but which may not always be considered due to concerns about sulphur compound production. The QTL process offers opportunities to bring out the best characteristics of naturally selected yeast.



TOTAL SO₂ (mg/L) 2.0

10

For fresh aromatic and clean white and red wines with low to no SO₂, H₂S and acetaldehyde production in a wide range of winemaking conditions. Recommended for high sugar fermentations. A workhorse strain.



Ideal for white varieties to promote varietal character, enhance aromatics and mouthfeel. A QTL yeast with low to no H₂S, SO₂ and acetaldehyde production. Recommended for Pinot Gris, Semillon, Chardonnay and Colombard.

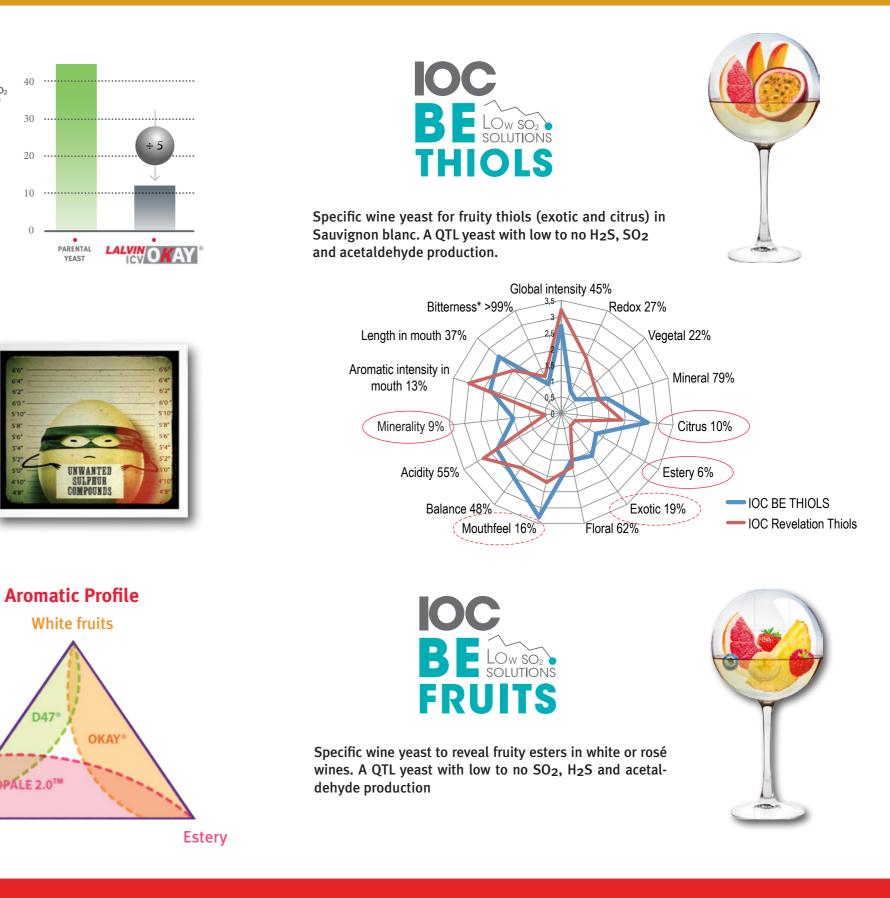


ICV OPALE[™]2.0

New wine yeast for rosé wines to bring out enhanced exotic and citrus aromas, while maintaining freshness sought after in rosés. A QTL yeast with low to no SO₂, H₂S and acetaldehyde production.

> Exotio fruits

This groundbreaking new selection technique (patent application PTC/IB220131050623) resulted in the wine yeasts: Lalvin ICV Okay[™], Sensy[™], Opale 2.0[™], IOC Be Thiols[™] and IOC Be Fruits[™].



Lowering the production of negative S-related compounds by the QTL wine yeast to below the sensory threshold allows the aromatic fruit contribution to be expressed in the wine.