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LALLEMAND
VOLUME 1, NUMBER 3

EDITORIAL

In search of the essential

27,000 That's how many times the words *mineral* and *minerality* appear in the more than 259,000 reviews on *www.winespectator.com*. That's twice as often as the word *fruity*. During the most recent Lallemand Tour with the theme "Minerals and Wine" from January 17 to 20, international wine journalist Cees van Casteren showed that, indeed minerality has become more than just a passing fad or trend in the world of wine.

The terms *mineral and minerality* have become increasingly important—so much so that they have become ubiquitous in wine tasting. But why the infatutation with minerality? During the Lallemand Tour seminars, aroma sculptor and self-proclaimed philosopher Michaël Moisseeff introduced a new way of thinking. Perhaps the omnipresence of minerality is in reponse to our pressing need to find the essential, as if our senses were rejecting the excessive amounts of noise, colours, smells, and tastes that we face on a daily basis. Minerality is reminiscent of vanitas art, a genre that was popular in the Baroque period when vanity and opulence ran rampant. Vanitas paintings make reference to death, resurrection, time, sand, and all things timeless.

So yes, we are right to wonder if the need for minerality is not simply some kind of desire for purity and eternity.

Make no mistake, the search for purity and the essential is not synonymous with simplicity and nature. While our senses may sometimes desire a certain deprivation, obtaining this kind of taste profile in a wine is far from easy. No defect must be allowed to mask this mineral purity; no excess must mar it. The search for minerality sometimes gets bundled together with the natural wine movement, in which we delude ourselves into believing that, through some kind of magic, the grape and terroir turn into the eternal nectar we so desperately seek. Pure fiction. In oenology, if you count on magic and the inexplicable, chances are you'll end up with vinegar. The advent of modern oenology has allowed us to try to understand and explain the phenomena of transforming grapes into wine as we strive to express the quintessence of each vintage and each terroir. These kinds of questions, paradoxes, and controversies have given rise to the greatest wines and to our greatest achievements in oenology. We mustn't close the door on the topic under the assumption that it is too mysterious to comprehend. We must instead continue to think about its origins, find ways to express and perceive it, so that we can continue to make our terroirs discernible in our products in the best way possible.

Philippe de Champaigne (1602–1674)
Vanitas, Allegory of the transience of life with skull and hourglass, 1646
Oil on canvas – 28.8 x 37.5 cm
Le Mans, Musée de Tessé

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OptiLEES®: New specific inactivated yeast for aging management

Aging on lees, an age-old oenology practice, is known for its many advantages, especially on the sensory qualities of wine. The practice also has its share of disadvantages, including the risk of contamination and the appearance of reduction faults caused by sulphuric odours. Today, specific inactivated yeast offers an alternative way to manage aging, all the while improving the overall sensory qualities in a controlled and risk-free manner.

Wine can be defined as a hydroalcoholic solution of molecules and ions with a colloidal system. The colloids are actually an aggregate of small molecules, macromolecules, and small particles like polysaccharides, tannins, glucans, and proteins that are naturally present in wine. The surface properties, stability, and interactions of this colloidal system have a major impact not only on the wine's stability but also on its sensory qualities.

When wine is tasted, the difference between the pH of the saliva (6.8) and that of the wine (between 3 and 4) creates a destabilization and alters the colloidal system, which directly influences taste perceptions (notably those linked to volume, sweetness, astringency, and mouthfeel). The presence and concentration of certain molecules (like polysaccharides) allows less reactive aggregates to form, which stabilizes the system and limits the astringency sensations, all the while improving the taste sensations. Since polysaccharides are formed during yeast autolysis, maturation on lees makes the wine richer in colloids. Nevertheless, they are released slowly during maturation on lees and pose certain risks, such as sulphuric odours and microbiological instability.

A natural alternative and the advantages of aging on lees

Adding specific inactivated yeast to wine can also be advantageous as adding quality and healthy lees. Recent studies show that colloidal interactions, and therefore the sensory impacts, differ depending on the type of polysaccharides, and more importantly on their molecular weight and structure. Lallemand has done extensive research in this area, selecting yeast with the optimal properties in terms of polysaccharides. Lallemand then inactivates the yeast according to one of two processes: The first, called MEX®, allows for very fast autolysis of the specific inactivated yeast (SIY) when added to wine. The polysaccharides that are released have a significant molecular weight. In the second process, autolysis is slower than with MEX and the polysaccharides that are released have a lower molecular weight.

Furthermore, the type of polysaccharides released and the rate at which they are released in the wine depend on the procedures and yeast used. OptiRed® and Booster Rouge® (offered by Lallemand and its partners for more than 10 years) are examples of yeast preparations made according to the first process. OptiLEES® is the fruit of recent research and development in the colloidal interactions with a yeast that had the unique ability to over-express the synthesis of polysaccharides. The yeast was then inactivated according to the second process before being added to the wine.

The effect depends on the polysaccharide

Professor Fernando Zamora, a researcher at the University Rovira i Virgili of Tarragona in their studies on the impact of climate change on ripening and possible adaptation strategies, recently presented some results that were very illuminating in relation to our previous knowledge of the impact of inactive yeast (Lallemand XXII[es] Entretiens Scientifiques, Dubrovnik, 2011). Actually, how the inactivated yeast impacts taste depends on the molecular weight of the polysaccharides released in the wine.

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OptiLEES®: New specific inactivated yeast for aging management *(cont'd)*

- Molecules with low molecular weight (made with Lallemand's second process, such as OptiLEES®) tend to enhance the sweetness and smooth finish.
- Molecules with a greater molecular weight (made with MEX®, the first process), however, enhance the perception of volume and roundness.

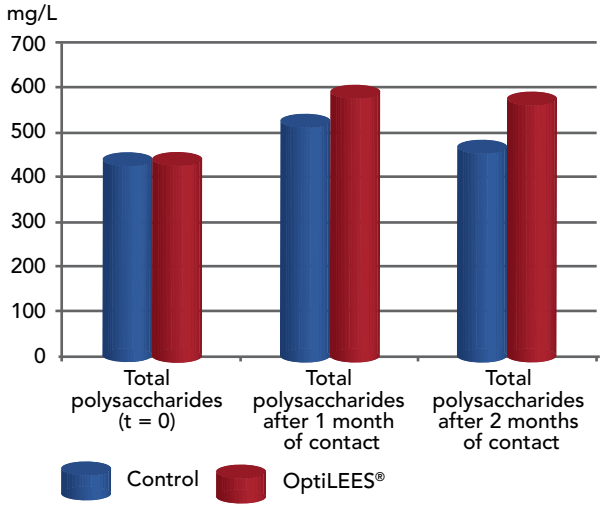

Figure 1: Total polysaccharides in Merlot-Syrah (D.O.C. Priorato, Spain, 2010) with and without Optilees® at 20g/hL.

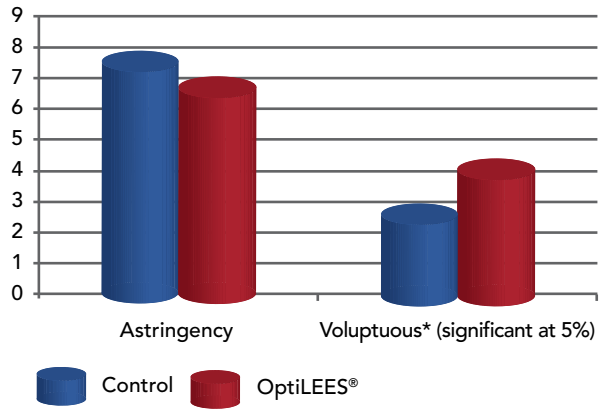

Figure 2. Sensory analysis of Tempranillo (D.O.C. Ribera del Duero, Spain, 2010) two months after the addition of Optilees®.

Being able to choose the type of yeast, the inactivation process, and the exact moment it is added to the wine opens the door to new possibilities in aging.

OptiLEES®, when added to wine at the very end of the alcoholic fermentation, gradually stabilizes the wine's colloidal system, all the while enriching it in a healthy manner, controlled by a large amount of polysaccharides with low molecular weight. After 1–5 months of contact, the sensory advantages are very tangible (improved structure, heightened sweet and soft taste perceptions, stable colour, intensified aromatic persistence and mouthfeel).

The gradual autolysis of polysaccharides, their presence in large quantities, and their specific characteristics make OptiLEES® especially attractive for use in wine.

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Wines and minerals — finding answers

Despite being all the rage among wine professionals, minerality remains difficult to define and even harder to explain scientifically. Nonetheless, recent studies discussed at the latest Lallemand Tour (January 17, 2012) have got us thinking about how minerals and wine interact.

Minerality and salinity—the missing link

For Xavier Vignon, consulting oenologist at the Institut Oenologique de Champagne (IOC), the question of minerality is reminiscent egg fining red wine with a pinch of salt. This dash of salt—which makes all the difference—has long been ignored, even forgotten, in the world of oenology. Yet mineral salts are an essential ingredient for beer brewers, whisky distillers, and the like. We often forget that wine is 85% water—and water is full of minerals. There is a clear distinction in taste depending on the content of mineral salts in mineral water. Similarly, the presence of anions and cations in wine has a strong influence on our perception of the wine, its quality, and sometimes the vintage. Vignon shared examples from the various trials he has carried out involving the addition of different minerals to red and white wines. He showed that these changes, though sometimes very small in analytical terms, interfere not only with the fundamental tastes of wine (bitterness, astringency, acidity, sweetness, and saltiness) but also with sensations such as volume and aromatic persistence.

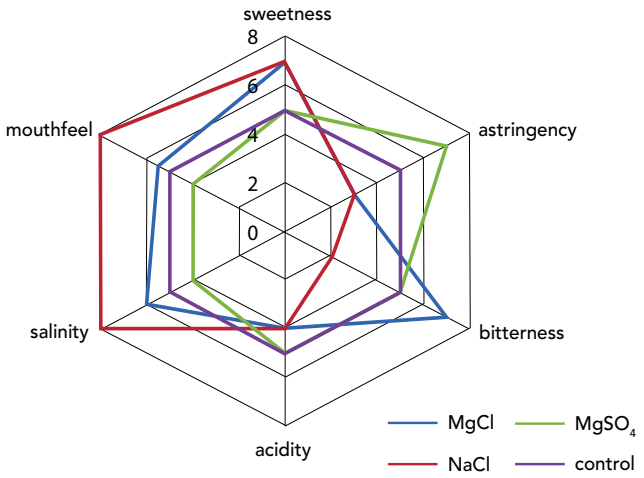

Figure 3: Compared effects of different cation additions per mineral salt addition to a red Côtes du Rhône (addition of 1.5 g/hL)

The studies, carried out in collaboration with the different IOC laboratories, helped to determine in part the impact that each mineral salt has on these tastes. The tastes themselves were analyzed separately. The results show that chloride ion seemed to be linked to a salty taste but also with a sensation of voluptuousness, while sulfate was linked to dryness and bitterness, etc. These results were then confirmed with wine using triangle tests and descriptive analyses. Still, the issue is more complex than it seems since the balance between the different ions remains a determining factor. Moreover, the relationship between the salt content and sensory perception is not always linear. It tends to be sinusoidal, so for example, as the quantity of chloride increases, the wine goes from a sensation of roundness to astringency and back to roundness again.

Yeast's involvement in the mineral content of wine

Vignon also touched on the various research projects underway in collaboration with the IOC and Lallemand on the influence of biotechnologies on the salinity of wines. In particular, their research is focused on the impact of lees and selected yeast. Certain selected yeast seem to increase salinity more than others, thereby decisively influencing the balance of tastes. These differences seem to be linked to the varying mineral salt contents and are more or less apparent depending on the varietal—more pronounced in Syrah and Merlot, less in Grenache.

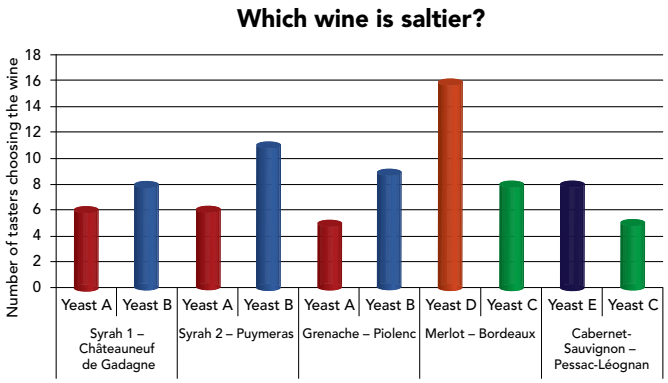

Figure 4: Results of a sensory analysis on the question (for each trial comparing 2 yeast methods): "which wine is saltier?"

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Wines and minerals — finding answers *(cont'd)*

The salty taste is clearly a fundamental issue, and it occupies an important place in the sensory approach to wine, as does the study of the mineral content of wine. Vignon concluded the lecture by proposing a comparative tasting of a wine containing 2% additions of different mineral waters. The differences were striking!

Yeast and minerals—an important interaction

Aside from the sensory impacts left to investigate, certain minerals are known to play an important role in the life of yeast. Their role is significant on many levels: growth and cell structure, fermentation performance, tolerance to stress, and enzymatic activity in particular. A minimum dose of 100 ppm of magnesium (Mg) is required in the fermentation environment. Any less will promote the yeast's respiratory activity and hinder fermentation. Magnesium plays a key role in the decarboxylation of pyruvic acid (one of the reactions that turns glucose into ethanol). It also strengthens the yeast's resistance to alcoholic stress by stabilizing the membranes and inactivating certain stress proteins. It is the Mg/Ca ratio, rather than the concentration of Mg itself, that influences the proper fermentation process, because these two minerals are highly antagonistic. If the ratio is too small (too much calcium, not enough magnesium), the risks associated with a difficult fermentation increase, such as residual sugars, increased volatile acidity and ethanol, and sensory unbalance, etc.

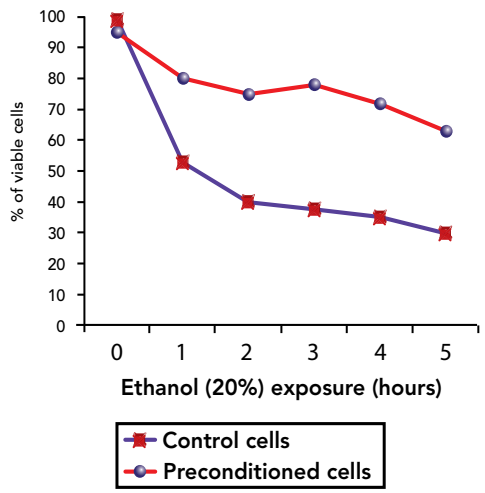

Figure 5: Role of magnesium in preconditioned yeast on resistance to ethanol"

Another essential mineral for yeast is zinc (Zn). In fact, it is absolutely necessary (even in very small quantities) for the last reaction in alcoholic fermentation, which is the transformation of acetaldehyde into ethanol. Starting at 0.5 ppm, zinc has very positive effects on the physiology of yeast, such as increased resistance to stress and improved fermentation performance. It also improves yeast enzymatic metabolism, which allows for a significant increase in the production of certain esters and higher alcohols with positive sensory effects, and a decreased production of acetaldehyde.

Optimizing the mineral nutrition of yeast

After Walker explained the biochemical mechanisms involving minerals in the physiology of yeast, he shared some of the results of practical trials demonstrating the major impact of these elements on the process of alcoholic fermentation. By using certain yeasts particularly rich in essential minerals (YSEO® yeast), it is possible to tangibly increase the viability of yeasts in different conditions of stress and clearly optimize overall fermentation performance. Similarly, the addition of complex or organic nutrients (specifically developed from inactivated yeast) introduces essential elements into the fermentation environment, increasing the bioavailability of mineral elements for the yeast. Since the content of minerals in the must is extremely variable and hardly ever measured, adding these types of nutrients can be very beneficial for alcoholic fermentation.

So, we can think of minerals as micronutrients that are as important to the yeast's behaviour as other factors like nutrients, yeast genotype, and environmental conditions (temperature, turbidity, etc.).

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SUMMARY

"The connoisseur does not drink wine but tastes its secrets."

Salvador Dali

Winners of the second annual ML Wines Contest organized by the ML School

On February 28, 2012, Madrid hosted the second annual ML Wines Contest organized by Lallemand's ML School. Renowned writer and editor-in-chief of the UK-based online wine magazine Wine Anorak (wineanorak.com) Jamie Goode served as panel chair. All wines were tasted and evaluated by over 70 attendees of eight different nationalities, including winemakers from participating wineries and an international panel. The winners in each category were:

- **CATEGORY I: 2011 Vintage Red Wines**. Malolactic fermentation with co inoculation (no oak contact).
  BODEGAS VALDUBÓN (D.O. Ribera del Duero) / Varietal: Tempranillo
- **CATEGORY II: 2011 Vintage Red Wines**. Malolactic fermentation with sequential inoculation (no oak contact).
  COOPERATIVA NUESTRA SEÑORA DE LA MUELA (D.O. La Mancha) / Varietal: Tempranillo
- **CATEGORIE III: 2011 Vintage Red Wines**. Malolactic fermentation with co inoculation or sequential inoculation (with oak contact).
  QUINTA DO CRASTO (D.O.C. Douro) / Varietal: Touriga Nacional

Next time in the oenom@g

Varietal thiols

We're always talking about thiols, but what are they? How important is their role in a wine's taste profile? How do you control and manage them? We'll be offering some tips in our next issue!

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Lallemand – a leading producer of wine yeast and bacteria selected from nature, and their nutrients, and a developer of specific enzyme applications – is a privately owned corporation with divisions operating around the world. The Oenology Division, based in Toulouse, France, has a major focus on research and development, both in-house and in collaboration with renowned research institutes.