

Selected from nature



WINEMAKING UPDATE

Number 1 – 2005

LALVIN® uvaferm ENOFORM®

FLASH NEWS

❖ **Lallzyme Lyso-Easy** Safe and easy to use with your starter cultures, **Lallzyme Lyso-Easy** is a 20% lysozyme solution with no additives, and is stable at room temperature. Using lysozyme early – before alcoholic fermentation – helps limit the development of unwanted indigenous lactic acid bacteria which are responsible for off-aromas in wines. Lysozyme also helps with the implantation of selected bacteria starter cultures. As **Lallzyme Lyso-Easy** is in liquid form, it is quickly homogenized in the tank and the lysozyme action is rapid and efficient.

❖ **ICV Elios 1** Selected from the Mediterranean *terroirs* and specially adapted for direct wine inoculation with malolactic bacteria, **ICV Elios 1** starter culture achieves regular and complete malolactic fermentation. To complement the range of the ICV selected wine yeasts, malolactic fermentation with **ICV Elios 1** adds the “final touch” to wine made from grapes that have a high and balanced maturity. The use of **ICV Elios 1** also results in good acidity and respects varietal characters.



WINEMAKING UPDATE

WINEMAKING UPDATE is a Lallemand Inc. publication. Its goal is to inform oenologists and winemaking staff about news and indications arising from research. To request previous issues, send your questions or comments contact us at:

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Beware! Avoid producing undesirable aroma compounds during uncontrolled MLF

During malolactic fermentation (MLF) lactic acid bacteria transform malic acid into lactic acid. When MLF is desired, winemakers will, through various means, encourage the process to take place during winemaking, before any further processing, such as fining, filtration or bottling. This avoids problems of instability and microbial spoilage in the bottle. While the acidity of wine is reduced through the MLF process, lactic acid bacteria also produce several other compounds called secondary metabolites. Naturally, some compounds, such as ethyl lactate and diacetyl, can have a positive impact, adding complexity to the wine when their concentration is appropriate. Lactic acid bacteria can also reduce the vegetal notes, astringency and bitterness, while contributing to roundness and positive tannin expressions. As all these contributions depend on the spe-

cific strain of lactic acid bacteria, the use of selected bacteria for malolactic fermentation increases control over these biological changes.

1. Organoleptic impact of MLF

Wines that have completed MLF with no problems are generally given such positive descriptors as butter, nutty, yeast, honey, vanilla, leather, spices, earthy and toasty, with more body and roundness, silky tannins and greater length on the palate. However, uncontrolled malolactic fermentation often generates negative descriptors, like intense lactic aromas, acid yogurt, sweaty notes, acetic, intense bitterness on the finish and animal notes. Diacetyl is not always a positive aroma compound, depending largely on its concentration in the wine and the style of wine. At levels of 5 to 14 mg/L, a buttery aroma is contributed, while at 2 to 4 mg/L, diacetyl confers nutty, caramel, yeast and wet fur notes.

TABLE 1: Undesirable defects caused by unwanted bacteria during MLF

Problem	Description
Lactic prickle	When sugar remains in the wine due to slow or stuck fermentations, conditions are favourable for the development of certain bacteria. Lactic acid bacteria will produce acetic acid from sugars they are using for growth.
Bitterness	From glycerol decomposing into acrolein. The combination of acrolein and tannins produces a very unpleasant bitter flavour on the finish of the wine.
Volatile phenols	In red wines, 4-vinylphenol, 4-vinylguaiacol, 4-ethylphenol and 4-ethylguaiacol can form. These compounds contribute aromas that recall stables and horse sweat. Although the appearance of these compounds can be related to the action of certain strains of <i>Pediococcus</i> and <i>Lactobacillus</i> , when MLF is delayed, most probably <i>Brettanomyces</i> takes over to form these compounds.
Mousiness	Some strains of <i>Lactobacillus</i> and <i>Oenococcus oeni</i> can produce aromatic heterocyclic bases that cause a distinctive mousy flavour.
Health hazards	Some compounds harmful to human health can be produced. Biogenic amines (histamine) can be produced by wild strains during uncontrolled MLF.

Continued

2. What happens when MLF goes wrong

When malolactic fermentation is not controlled or managed well, volatile acidity may increase. Excessive diacetyl can also reduce the fruit character. Certain types of lactic acid bacteria can produce undesirable flavours or cause loss of colour due to the enzymatic activity of the bacteria and an increase in pH. The production of histamine, which is harmful to human health, could be influenced by MLF. The organisms responsible for all these problems are certain wild strains *Oenococcus* and several strains of *Lactobacillus* and *Pediococcus*. Table 1 lists some of the undesirable defects possible.

3. Are wine defects perceivable by the wine drinker?

In a study conducted in collaboration with Rioja University with Spanish wine connoisseurs, on wines spiked with a series of potential aroma defects generated by uncontrolled MLF, it was found that the participating wine drinkers could indeed detect the defects. The following compounds were added at different concentrations usually found in wines: diacetyl (white wine, at 0.1 ppm, 5 ppm, 10 ppm; and red wine, at 0.1 ppm, 10 ppm, 30 ppm); volatile biogenic amines (putrescine and cadaverine in red wine at concentrations of 1 ppm, 10 ppm, 50 ppm and 100 ppm); and ethyl phenols (ethylphenol and ethylguaiacol in red wine at concentrations of 425 mg/L, 800 mg/L and 1000 mg/L). Following the tasting, a professional expert taster tasted the wines and described them in parallel with the results of the wine drinkers.

The tasters perceived a high frequency of defects, which they identified using descriptors of their own choosing. In the case of the ethyl phenols and diacetyl, the frequency of perception

increased as the concentration of the added material increased, more for the white wine than the red.

The tasters described the defects using their own words: ethylphenol reminded them of stables, leather, animals, cow manure, horses and asphalt; ethylguaiacol reminded them of mould, medicine and smoke. In white wine, diacetyl was obvious as a butter or cheese aroma, with a similarity to oxidation, making the wine appear aged. Diacetyl was also identifiable in the red wine, contributing characters associated with butter and almond. The tasters were relatively less sensitive to the added biogenic amines. Increasing the concentration of putrescine did not enhance identification of the defects caused by this compound. However, this molecule was described as causing rotten fruit odours, a sensation of fermentation as well as rancid and dirty. Cadaverine was identified more readily at higher concentrations, causing meaty, vinegary and dirty aromas.

The same 22 wines were submitted to the blind expert taster. This professional observed defects in all the treated wines. His detailed descriptions confirm those of the wine drinkers. Thus, it can be concluded that wine drinkers are able to detect faults in wines contaminated by microorganisms. The organisms that cause these problems are primarily *Lactobacillus* and *Pediococcus*. Therefore, managing malolactic fermentation in wine is crucial. This can be achieved through high standards for hygiene in the cellar and the use of selected malolactic bacteria.

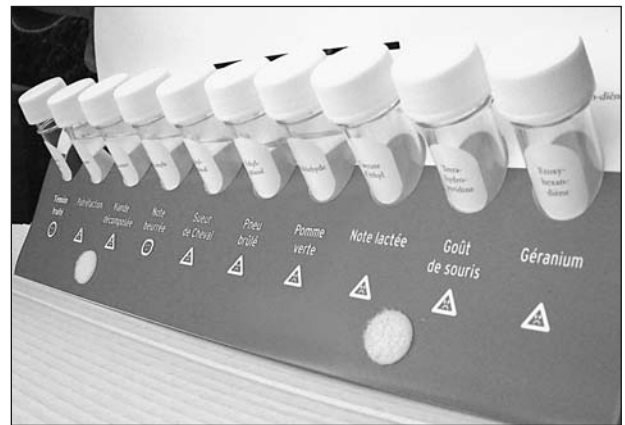


FIGURE 1

4. A test for your sense of smell and taste

A kit (Figure 1) was developed by Lallemand to evaluate the impact of some compounds in wine. By adding the different secondary compounds produced by wild bacteria to a selected wine, the winemaker can smell and taste the consequences. The kit consists of 9 vials containing aroma active compounds known to cause defects in uncontrolled MLF, including putrescine, cadaverine, diacetyl, ethylphenol, ethylguaiacol, acetaldehyde, ethyl lactate, 4-hydroxy-pyridine, etoxyhexandien. Table 2 describes the aroma impact of each compound. The purpose of the kit is to educate winemakers and wine specialists on the potential risks associated with uncontrolled MLF, where wild lactic acid bacteria are producing the above compounds.

Compounds	Sensory sensation
Putrescine	Putrefaction
Cadaverine	Rotten meat
Diacetyl	Buttery notes
Ethyl phenol	Horse sweat
Ethyl guaiacol	Burnt tire
Acetaldehyde	Green apple
Ethyl lactate	Milky
4-hydroxy-pyridine	Mousy taint
Etoxyhexandien	Geranium

TO SUMMARIZE ...

The impact of such compounds on final products represents a significant quality issue as consumers can detect the aroma defect and, in some cases, identify it accurately. It is also an important factor when wines are destined for exportation to countries where such compounds as biogenic amines are rigorously controlled. Consequently, it is important that winemakers be aware of these issues. Better still, it is important they prevent any microbial contamination of the wine by controlling the malolactic fermentation. This is possible, by maintaining good hygiene conditions in the cellar, and by using selected bacteria to carry out malolactic fermentation. These simple measures prevent the presence of microbial contaminants in the wine and, consequently, prevent deterioration.