

Selected Wine Bacteria:

RESTARTING STUCK MALOLACTIC FERMENTATION

The latest easy and fast protocol for white, rosé and red wines

STEP 1

The use of specific yeast cell walls ResKue™ will help to detoxify the wine by trapping the main MLF inhibitors, mostly pesticides residues and medium chain unsaturated fatty acids.

DETOXIFY THE WINE

A

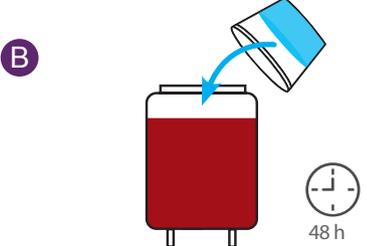


30 g/hL

30-37°C

Wait 20 mn

B



48 h

- Prepare ResKue™ at 30 g/hL; rehydrate in 10 times its weight in water
- Mix then wait for 20 minutes
- Add to the stuck wine and homogenize
- Allow to settle for 48 hours avoiding oxygenation.
- Rack the wine into another tank avoiding high exposure to oxygen

STEP 2

In order to ensure an optimal growth of the new bacteria inoculum, ML RedBoost™ is essential. It has been developed to bring the optimal levels of specific nutrients for wine selected bacteria in terms of amino acids and peptides, and also to provide protection for the selected wine bacteria against the inhibitory effect of certain polyphenols.

MLF ACTIVATOR ADDITION



20 g/hL

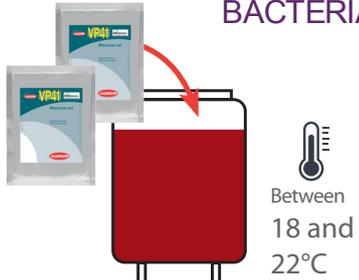
Wait 24 h

- Prepare ML REDBOOST™ at 20 g/hL; resuspend in water or wine
- Ensure a good distribution into the wine
- Wait 24 hours before bacteria inoculation

STEP 3

After several years of worldwide experiments of stuck MLF wines, our R&D department have shown that a double dose inoculum of LALVIN VP41 MBR™ is the best answer to restart stuck or sluggish MLF.

BACTERIA INOCULATION



Between 18 and 22°C

- Inoculate with double dosage of LALVIN VP41 MBR™ without rehydration step (for example: 2 doses of LALVIN VP41 MBR™ 25 hL to restart 25 hL of wines).
- Maintain a stable temperature between 18 and 22°C during all the processes and until the completion of MLF.

This protocol is efficient when wines parameters are not outside of known limiting conditions (high SO₂ content, high alcohol content, low pH, possible excessive amount of pesticides residues, possible presence of Chitosan in certain conditions).

Note : Lallemand has also developed a "quick fermentability test" (48-72 hours test). This quick test can be run to determine precisely whether a wine may complete fermentation once re-inoculated. Please, ask your Lallemand representative for further information.

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Potential causes for incomplete malolactic fermentation (MLF)



Inappropriate selection of bacteria

The choice of the selected bacteria, timing of inoculation, and respect of the instructions of use (dosage, rehydration temperature) and storage conditions are key to ensure a good successful MLF.



SO₂ levels

Free SO₂ will inhibit bacteria growth and MLF completion even at low levels; it's impact is even stronger at low pH. But total SO₂, when higher than 50ppm can have a negative impact on bacteria vitality: in this case selected bacteria with higher total SO₂ tolerance need to be chosen.



pH

Every selected wine bacteria has its specific limits with regard to pH. If the wine pH is lower than the pH limit of the selected bacteria, MLF may not proceed. In the case of wine pH lower than 3.5 the bacteria tends to require more nutrients to perform MLF accordingly.



Nutrient limitation

This is considered to be one of the major causes of incomplete MLF. Lactic acid bacteria have specific needs for peptides and amino acids which have to be satisfied in order to achieve an optimal growth and metabolism to perform malolactic fermentation, especially under limiting conditions.

Other inhibiting compounds

- **Certain phenolic compounds** can inhibit MLF, such as condensed tannins, whereas others, such as anthocyanins can stimulate them.
- **Pesticides residues** are known to cause sluggish, stuck or complete inhibition of MLF.
- The presence of high **L-lactic acid content** (in case of high initial level of malic acid) can inhibit the good success of MLF if the right resistant selected bacteria are not used.
- The treatment with new solutions like chitosan or chitin derivates can disturb a good start or full achievement of MLF, depending on wine conditions and on the treatment timing.
- **Some yeast strains**, especially when they have struggled to complete alcoholic fermentation, can release toxic metabolites which cause MLF issues.
- **Medium-chain unsaturated fatty acids** can also have a negative impact on bacteria growth and activity.



Ethanol content

As for all microorganisms, ethanol can have a strong toxicity especially at high temperature. The key is to choose the appropriate bacteria/strain which can tolerate the respective ethanol content of the wine.



Temperature

Optimal temperature for MLF is between 18 and 22°C. Some bacteria differ in their tolerances to lower temperatures and it's usually better to avoid higher temperatures in the case of low pH wines and wines with high ethanol or SO₂ content.

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Selected Wine Bacteria:

QUICK MLF FERMENTABILITY TEST

PURPOSE OF THE QUICK FERMENTABILITY TEST

Lallemand has developed a 48-72 hour test to determine the potential success or failure of re-inoculating a stuck MLF with a fresh starter culture. This test helps to determine whether a wine may complete fermentation once re-inoculated.

'QUICK FERMENTABILITY TEST FOR STUCK MLF'

To choose the best approach to restart a stuck malolactic fermentation it is recommended to run the 'Quick MLF Fermentability Test'.

• 2.5g / 2.5hL MBR® Bacterial Sachet of Lalvin VP41™.

1. Immediately before undertaking this protocol, accurately determine the malic acid (g/L) content of the problematic wine (MA_1).
2. Rehydrate the contents of the bacterial sachet (2.5g/ 2.5hL sachet) in 50mL of clean chlorine-free water at 20°C. Gently stir and leave for 10 minutes.
3. Inoculate 1000 mL of wine with 2 mL of the bacterial suspension (this gives a 10x higher inoculation rate)
4. Maintain temperature at 20°C for 48-72 hours.
5. 48-72 hours after bacterial inoculation, accurately determine the Malic Acid (g/L) content of this small batch of problematic wine (MA_2).
6. THEN DETERMINE THE PERCENTAGE OF MALIC ACID DEGRADATION OVER THE 48-72 HOUR PERIOD. This will indicate the most appropriate protocol to undertake.

$$(MA_1 - MA_2) / MA_1 \times 100 = \% \text{ of Malic Acid degradation}$$

- Quick Fermentability Test > 60% degradation:
Restart the MLF following the 'Restarting stuck malolactic fermentation' protocol - without ResKue™, and ensure that the temperature is 18-22°C..
- Quick Fermentability is between 20-60% degradation
Follow the 'Restarting stuck malolactic fermentation' protocol.
- Quick Fermentability Test <20% degradation:
 - High level of inhibitors, direct inoculation might be difficult - contact your Lallemand representative.

Contact your Lallemand representative for further advice.

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