

# Taking the Mystery Out of Malolactic Fermentation

By Steve Kroll

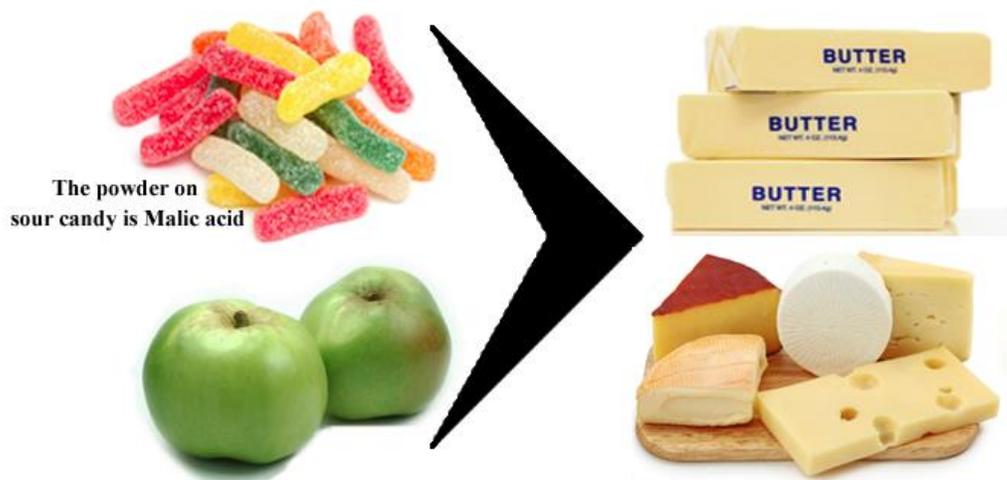
For thousands of years, malolactic fermentation, often abbreviated as MLF, was a process that wasn't completely understood. Winemakers in Europe would occasionally note that as winter gave way to spring, the wine they made the previous autumn would sometimes begin bubbling again as it warmed up. These wines also took on a softer, rounder, more desirable flavor profile as a result. However, it wasn't until the 19<sup>th</sup> century that scientists understood this transformation to be the result of bacterial activity in the wine, and not until the late 20<sup>th</sup> century before commercial bacteria cultures were available.

Even now, though, many home winemakers continue to be intimidated at the thought of putting wine through malolactic fermentation. As you'll see, it really isn't terribly difficult, provided you follow a few simple guidelines.

## What is Malolactic Fermentation?

The two primary acids found in wine are tartaric acid and malic acid. Malic acid is also found in apples, and is what gives the fruit its characteristic tartness. Malolactic fermentation is the process whereby bacteria metabolizes malic acid and converts it to lactic acid and carbon dioxide. Lactic acid is typically found in dairy products, such as milk and cheese, and has roughly half the strength of malic. MLF typically takes place after alcoholic fermentation is complete, and is initiated by adding a commercial bacteria culture to the wine. The entire process can take anywhere from one to three months to complete.

Some of the barriers to successful completion of MLF are cold temperatures, very high acidity, high alcohol levels, and excessive levels of metabisulfite.



## What kind of wines benefit from MLF?

There is a school of thought that most, if not all, red table wines should be put through malolactic fermentation. I would agree. In addition to contributing to a desirable sensory profile, it also lends some

degree of shelf stability. Indeed, wines that aren't put through forced MLF (or otherwise sterile filtered) will always be inherently susceptible to going through it naturally – often times after the wine has been bottled.

In addition to red table wines, some white grape wines may also benefit from the softening effect of MLF. Chardonnay and Sauvignon Blanc are two examples.

Highly aromatic whites, such as Riesling and Muscat, do not generally benefit from MLF, nor do fruit wines. Additional care needs to be taken to ensure that these wines don't go through MLF on their own.

### **How and when should I initiate MLF?**

Malolactic bacteria cultures are available through most home winemaking supply stores. You will usually find it in the same section of the store where packaged yeast is sold. Note that ML cultures don't have a long shelf life, and should be kept refrigerated to help ensure viability. Although liquid cultures were popular at one point, most of what you'll find anymore comes in powdered form. ML culture can be quite expensive, although a single package, unless otherwise noted, will be enough to inoculate 60 gallons of wine.

Powdered ML culture should be reconstituted in water. Follow the package directions carefully and pay close attention to the temperature of the water used. If you have to divide the culture among several containers, you can accomplish this by using a syringe to measure out the dosages (such as the type included with wine acid test kits). Add the culture and stir it gently into the wine and move the container to a warm place. You may not see any activity at all for several days. But, if the culture has taken, before long you will see very tiny bubbles on the surface.

Most wine is inoculated after alcoholic fermentation is complete, however, there may be circumstances where it's desirable to employ a technique known as *co-fermentation*, where alcoholic and malolactic fermentations are performed simultaneously. In this case, you would inoculate the must with malolactic culture shortly after alcoholic fermentation has commenced. Although, in theory, there is a very slight possibility that it could lead to a stuck fermentation, in reality I've never heard of a single reported case. And despite evidence that there is a very small increase in the production of volatile acidity, the difference is so minor as to be virtually undetectable by trained tasting panels. Co-fermentation is sometimes used in high sugar musts or where the acidity is very high, as both of these conditions might make post fermentation MLF difficult, if not impossible. Hybrid grape varieties are a case in point.

It should also be noted that you should not add metabisulfite to any wine where MLF is desired, as high SO<sub>2</sub> levels will inhibit bacterial activity. Racking should also be avoided. Simply set the container undisturbed in a dark, quiet area until it completes. Once MLF has completed, you can then rack and add sulfite as usual.

### **I've inoculated my wine. How do I know if MLF is underway?**

Physical evidence of ongoing MLF is the presence of very small bubbles appearing on the surface of the wine (you may or may not see any airlock activity, however). You can also spot it by shining a flashlight through the narrowest point of the carboy, where you should see small bubbles of carbon dioxide occasionally darting up to the surface. If you remove the bung and smell the wine, you may also be able to detect a faint cheese-like aroma.

### How do I know when it's finished?

Traditionally, a paper chromatography test was the only surefire method for measuring completion of malolactic fermentation. There are newer tests available these days. One product I've found to be reliable is Accuvin Malic Acid test strips. A few drops of wine are deposited on the strip, and after a few minutes a color change will take place, indicating the presence (or absence) of malic acid. When the strip shows a very light gray, MLF is complete. At this point you can safely add SO<sub>2</sub> and rack the wine off the lees.

### Creating an environment for successful MLF

In general, the more favorable the conditions, the more likely you are to have good results. As stated earlier, some of the barriers to successful MLF are:

- **Cold temperatures.** ML bacteria works best between 60° and 75° Fahrenheit.
- **Low pH/high acidity.** When dealing with very acidic grapes, you may want to consider using the co-fermentation technique described above. The theory is that unfermented grape must presents a much more welcoming environment for the bacteria.
- **High SO<sub>2</sub> levels.** If you desire MLF in your wine, be judicious with metabisulfite additions before fermentation, and certainly don't add any additional metabisulfite before ML inoculation.
- **High alcohol levels.** If you have a very high sugar red must, this might be a good candidate for co-fermentation.

If you can overcome most of these unfavorable conditions, you should have no problem whatsoever bringing your malolactic fermentation to a successful conclusion.