

## Malolactic Fermentation

Written by Carl Eshelman

Tuesday, 10 March 2009 03:12 - Last Updated Tuesday, 10 March 2009 03:17

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**WHAT IS IT?** Malolactic fermentation is the conversion by bacteria of **malic acid** into **CO<sub>2</sub>** and **lact**

**ic acid**

. One gram of **malic acid** converts roughly into 0.67 grams of **lactic acid** and 0.33 grams of CO

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### WHY USE IT?

There are several reasons:

1. The primary reason for using malolactic fermentation is to reduce acid in red wines and some selected white wines by organic rather than chemical means.

Typically both red and white grapes grown in B.C. are characterized by low pH and high TA, both in combination indicating that the **malic acid** is probably higher than the **tartaric acid**

2. The chances are that if it is not used under controlled conditions, it will happen spontaneously, usually after the wine has been bottled.

This is the phenomenon where wines "awaken" in the Spring when temperatures begin to rise. By this time, the pH is usually higher than it was before fermentation and SO<sub>2</sub> levels have been reduced.

3. A wine high in **malic acid** is naturally more acidic; therefore, the greater the reduction the smoother the wine.

4. The more aggressive and pronounced **malic acid** is replaced by the less aggressive lactic acid.

5. The young wine loses its hard and acidic edge:

- its colour loses some of its vividness,
- the grape odour becomes richer and more vinous,
- wines become more mellow and full-bodied
- wines tend to become buttery as a result of the formation of **diacetyl** during the malolactic fermentation.

The latter phenomena are stylistic reasons for using malolactic fermentation.

### SHOULD IT BE USED ON ALL RED AND WHITE GRAPES?

No.

Typically malolactic fermentation is used only on red wines destined for aging and selected white wines such as Chardonnay, Pinot Blanc and Pinot Gris. Wines such as Gewurztraminer,

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Ehrenfelser, Riesling and other wines noted for their aromatic characteristics should not undergo malolactic fermentation, as they depend upon the **malic acid** to enhance their flavour components. They are also typically higher in acid than wines destined for table use as they also usually have residual sugar that offsets the higher acid.

Wines that have undergone malolactic fermentation require lower additions of SO<sub>2</sub> to maintain stability than those that have not undergone malolactic fermentation. The former may be stabilized with about 100 - 120 ppm SO

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while those not undergoing malolactic fermentation will require fining and filtering as well as additions up to, perhaps, 150 ppm SO

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## WHAT ARE THE CONDITIONS CONDUCIVE TO MALOLACTIC FERMENTATION?

There are several, some critical:

1. pH is the single most important factor The ideal pH is about 4.0, too high for safe use, but ideal for developing a starter. Normally, the pH for reds should be above 3.3 and for whites 3.4: however, there are strains of Malolactic bacteria available that will work well below these pH's.

2. Temperatures should be above 20 - 30 C. So the best time to inoculate the must with the malolactic bacteria is when the wine is about one-third through the yeast fermentation, as the fermentation process generally maintains that range of temperatures.

3. Low alcohol is also preferred, thus the above-mentioned time of inoculation

4. Unclarified wine is preferred because of the contained nutrients, thus one more reason to inoculate during the latter stages of fermentation.

5. Low SO<sub>2</sub> levels are also necessary, usually between 10 and 20 ppm, the amount added during crushing or settling; although, unless the grapes are less than perfect, no SO

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additions are required until either the pressing of the reds or the first racking of the whites.

## WHAT MALOLACTIC CULTURES ARE AVAILABLE?

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I have used three:

1. A freeze-dried culture that had to be rehydrated, was quite expensive and generally a pain in the butt.

2. A standard liquid culture of two strains - ER1A and EY2D - from Oregon State University available from Spagnol's. It is easy to use and is efficient at lower temperatures - down to 10 , and lower pH's - down to 2.9. It can be used for both reds and whites by making a standard starter using apple juice which has the ideal pH of 4.0. I usually build the starter to one gallon then start adding grape juice in order to build it up more as well as to sensitize it to the lower pH. I have never had a failure with this culture. A packet costs about \$7.50

3. A dried culture - Oenos Viniflora - available from Flory Bosa. A very small amount, about one-eighth of a teaspoon in 25 gallons, is sprinkled on top of the wine. I used it for the first time last year. It works very well without making a starter. However, the larger the culture count, the more efficiently the fermentation will proceed, so this year, I will probably make a starter. It is very expensive, about \$85, but it is good for about 1000 gallons and can be kept for about two years in the deepfreeze.

### WHY USE A CULTURE?

As stated above, if you don't induce malolactic fermentation, it is likely to occur on its own; therefore, why use a cultured starter?

The answer is the same as for using a yeast culture: both yeast and malolactic fermentations will occur on their own and may, in fact, be quite safe. On the other hand, wild malolactic bacteria like wild yeasts are not always friendly. There are few strains of malolactic bacteria that are friendly such as leuconostoc and oenococcus oeni. Wild strains include pediococcus which produces brettanomyces and lactobacillus which produces a buttermilk character; as well, wild things include acetobacter which produces vinegar.

### HELPFUL HINTS

1. If you have to add acid in order to bring the pH down, use only tartaric not an acid blend. Commercial acid blends contain tartaric, citric and malic acids. Citric acid can promote acetic acid formation. Commercial malic acid contains two forms of malic acid and malolactic fermentation converts only one of them.

2. Do not use any form of sorbate in a malolactic-fermented wine. In the event of renewed

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malolactic fermentation, sorbate will produce **geraniol**, an unpleasant geranium-like odor.

3. All my reds undergo malolactic fermentation, but I like to do partial fermentations on my whites if possible. For example and depending upon both the volume and my barrel capacity, I usually put a portion of the wine into a barrel with the malolactic culture and a portion in glass or stainless steel without the malolactic culture. Both are then blended and sterile filtered with an addition of SO<sub>2</sub>. So far, I have not had any renewed malolactic fermentation.

4. Check the progress using color chromatography.

Prepared by Bill Collings

Courtesy of [VAWA](#)