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LALLEMAND

WINEMAKING UPDATE

Number 2 – 2006

LALVIN uvaferm ENOFERM

FLASH NEWS

❖ **Hybrid yeast**

A new wine yeast strain for white and rosé wines is available this year. This yeast strain is the result of a natural cross between some of the best *Saccharomyces cerevisiae* strains to obtain a yeast with truly outstanding qualities. Particularly well adapted to wines with fresh and fruity aromas, and a smooth and round mouthfeel, this new strain is called **CROSS EVOLUTION**. Stay tuned to hear more about this promising new star of winemaking.

❖ **New winemaking guide**

To help winemakers select the best enzyme and the right dosages based on various parameters (e.g., must composition, wine style, etc.), a new winemaking tool has been developed and is now available at www.lallemandwine.com. For example, if a clarification enzyme is needed, the software will ask such questions as the grape varietal, the type of harvest and press, the pH and temperature of the juice, and will allocate a specific value to each answer. It will then recommend an enzyme (Lallzyme HC or Lallzyme C-Max) at the right dosage, from 0.5 to 3 g/hL. With this tool, the winemaker can then add the right amount of the correct enzyme.

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WINEMAKING UPDATE

WINEMAKING UPDATE is published by Lallemand to inform oenologists and winemaking staff about the latest news and applications arising from research. To request previous issues, or to send your questions or comments, contact us at:

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NEW FERMENTATION STRATEGY:

DYNAMIC SYNERGIES

Traditionally, alcohol fermentation during winemaking was carried out by the indigenous population of microorganisms, where the *Saccharomyces cerevisiae* yeast generally predominated. For many years, the trend has been to use selected natural active dry yeast, in a pure form, to master fermentation and avoid sensory deviations. It is now recognized that the use of naturally selected yeast is an efficient and secure way to obtain regular and trouble-free fermentation. Several studies have demonstrated that active dry yeast influences the reliability of fermentation, maintains the differences between yeast strains, grape varietals and terroirs, and has a positive impact on wine quality. Yeast is often selected for a particular property or a precise objective (e.g., fermentation rate, ethanol resistance, aroma production or specific enzyme activity). With the continuing demand to increase complexity and maintain typicity, winemakers may want more than one advantage when using a starter culture, or they may want to avoid blending wines.

Today, the use of a mixed culture (either commercially available or through cellar experimentation) remains empirical and it is doubtful that the characteristics of each strain used in the mix can be maintained. The Lallemand research department (Languet 2005), in collaboration with the INRA-Montpellier (France), has started to analyze the potential interactions among different yeast strains, in the right ratio and dynamics to assure high fermentation security while elaborating on the sensory properties of the wine. Lallemand has studied different interaction mechanisms among yeast strains, based on rigorous experimental methodologies. Studies of yeast population dynamics allowed us to realize mixed starters that are innovative and answer the needs of winemakers. To illustrate some of the possibilities, we present an example of this dynamic synergy in this issue of ***Winemaking Update***. Two yeast strains were used for this approach: one is considered a vigorous strain with good fermentative capacities and low nutritional needs, the other has a particular sensory impact in both red and white wines during alcoholic fermentation, but may sometimes lead to sluggish fermentations under particular conditions.

1. Study of the behaviour of an individual yeast strain

The yeast strain BM45 has acquired a solid reputation with winemakers for its sensory qualities. Isolated from Montalcino, in the heart of Tuscany, and selected in collaboration with the wine consortium of Brunello di Montalcino and the University of Sienna, this strain has been shown in many studies (Escot 2002) to increase the mouthfeel and roundness of the wine while maintaining the fruit-forward characteristics. Indeed, this yeast will positively influence the polysaccharide/tannin interactions and will therefore decrease the drying astringency of wines. Figure 1 illustrates the production of parietal polysaccharides produced by BM45 during fermentation, and compared to other yeast strains, the quantity is much higher. Polysaccharides in wine are important for the following reasons:

1. The have a protective effect on tartaric acid and protein precipitation.
2. They regulate the volatility of aromas.
3. They stimulate malolactic fermentation.
4. They increase colour stability.
5. They impact on mouthfeel.

Figure 1. Release of polysaccharides during alcoholic fermentation in a synthetic must at 25°C (Rosi et al., 1998).

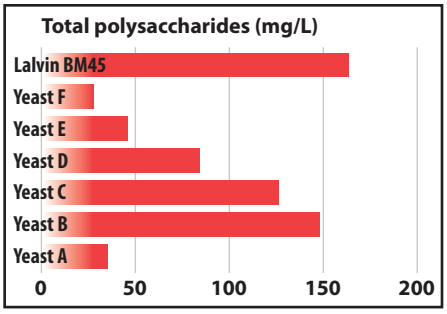

Figure 2 illustrates the pattern of polysaccharide release for BM45 during fermentation, compared to another yeast strain. Note that the largest release of polysaccharides occurs very early during alcoholic fermentation for BM45. The polysaccharides released during alcoholic fermentation have a much greater positive influence on the astringency of the wine (Escot 2002) compared to those released during aging on lees. This is particularly interesting for wines that are released to the market early on, because they will possess a structure

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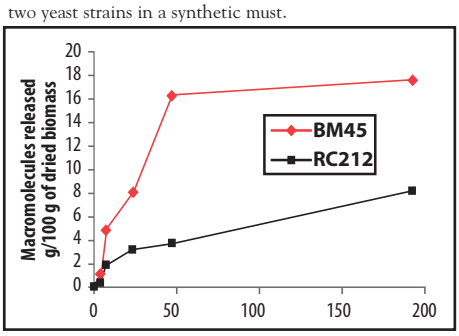
and smoothness that is not as developed in younger wines.

Figure 2. Release of mannoproteins (polysaccharides) by two yeast strains in a synthetic must.

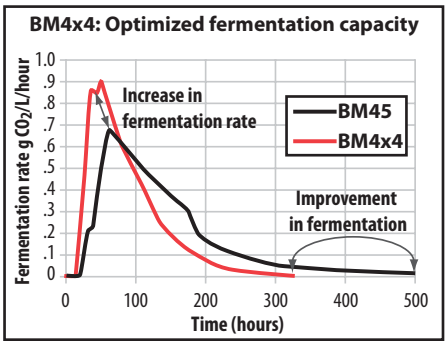


Due to its higher demand for nitrogen during alcoholic fermentation, BM45 has a particular need for careful handling through good fermentation management (nutrient and oxygen additions), especially under difficult fermentation conditions. This is where dynamic synergy comes into play.

2. What are the benefits of dynamic synergy?

The use of mixed starters was studied to find a combination of complementary strains that could maintain the sensory properties of BM45 while ensuring steady fermentation, especially under difficult conditions. One of the main challenges was to find a population balance that takes into account the nutritional variability of must, in terms of sugar, nitrogen, micronutrients, and could lead, under a variety of conditions, to the maintenance of the specific yeast properties that increase the mouthfeel and roundness of the wine, while providing the security of vigorous fermentation. The BM4x4 was born!

Figure 3. Fermentation kinetics of BM45 versus the BM4x4 mix.



2.1 Fermentation rate

Fermentation kinetics using different deficient musts and different population levels were followed, to evaluate the best combination of the BM45 yeast strain, along with the strong and steady fermentor. The results in Figure 3 show that the best mixed population levels clearly influence the fermentation rate. We can see in this figure that the yeast strain mix (BM4x4) overcomes the slower fermentation kinetics of BM45.

2.2 Sensory properties

The sensory properties of BM4x4 had to be similar to those of BM45 in order to meet the goal of a yeast strain mix with all the benefits of BM45. Several sensory analyses were carried out, on Mourvèdre wines, for example, comparing the BM4x4 mix, BM45 alone, and the vigorous strain alone. The wines fermented with BM4x4, the mixed culture, were not significantly different sensorially from those obtained from the fermentation of BM45, but different from those obtained from the fermentation with the vigorous strain alone. This meant that the BM4x4 wines were fruit forward, with round mouthfeel, increased volume and decreased astringency typical of the BM45. Regarding the colour, the interaction between polysaccharides and tannins occurs rapidly during alcoholic fermentation for both for BM45 and the BM4x4 mix. The colour evolution for stability was very similar for both, but much slower in the wines fermented with the vigorous strain alone. It would appear that the polysaccharides interactions properties are still present in the case of mixed yeast strain fermentations, as is their impact on the colour. In the following example (Figure 4), a wine-making trial on a 2005 Gamay (Beaujolais, France), the total polysaccharides versus the bound polysaccharides was measured and the wines fermented with BM4x4 were compared to a standard yeast strain used for Gamay. The BM4x4 wines show a definite increase in both total and bound polysaccharides. The higher amount of bound polysaccharides will reduce the astringency of the wines, increase the mouthfeel and structure, and will help stabilize the colour.. The results of the sensory analysis by a tasting panel has shown that the Gamay wines fermented with BM4x4 were significantly preferred, compared to the control (Figure 5).

Figure 4. Polysaccharides measured in Gamay wines fermented with BM4x4 mixed yeast strains and with a control yeast.

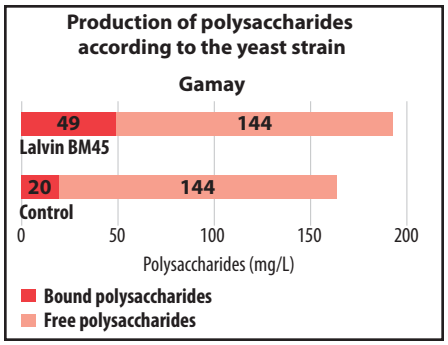
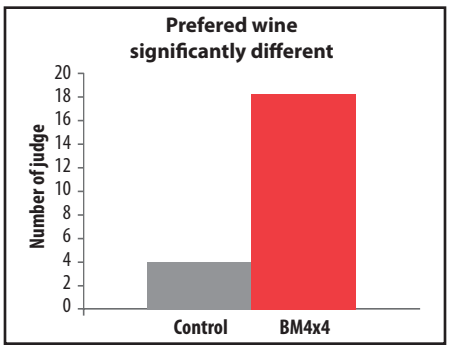


Figure 5. Results of a preference test of a Gamay wine fermented with the mixed culture BM4x4 versus the control yeast.



3. Interspecies synergy – A look into the future

The example above shows just one of many possibilities to improve naturally selected yeast, without interfering with nature. Finding the best population balance to maintain the positive aspect of one strain and taking advantage of a characteristic of another strain is just the beginning in terms of developing new fermentation strategies. The possibilities are numerous if many strains can be studied for their optimum synergies, and then blended in appropriate mixes. Other current projects involve the use of sequential inoculation of non-*Saccharomyces* yeast strains coupled with *Saccharomyces*, as well as the development of *Saccharomyces* yeast strain mixes. Another interesting example of interspecies synergy is the growing popularity of *Saccharomyces*/*Oenococcus oeni* co-inoculation for alcoholic and malolactic fermentation. Our research has shown the benefits of this technique under certain conditions to maintain the fruitiness of the wine while reducing acidity.

TO SUMMARIZE ...

As we are at the beginning of using dynamic synergy cultures in fermentation as part of a diversified fermentation strategy, the promising results make the future look very bright. The BM4x4 yeast strain mix that pairs the BM45 yeast strain with a strong complementary fermentor meets the preset criteria, and other yeast strain mixes are now in development.

The BM4x4 yeast strain mix offers:

- The positive sensory characteristics of BM45
- Fermentation security
- A positive impact on both red and white wines.

However, winemakers must avoid "homemade": mixes, as research has shown that the best yeast combination at the right population levels must be found in order to maintain the qualities of the strains used.

Ask your Lallemand representative whether this yeast product could be suitable for your fermentation needs.

References available upon request.