

## **Active Dry Wine Yeast\***

**By Dr. Murli Dharmadhikari**

Grape juice/must can be fermented by the yeasts present on grapes and in the winery. This kind of fermentation is often called natural or spontaneous fermentation. Some winemakers rely on spontaneous (uninoculated) fermentation to gain flavor complexity and, consequently, higher wine quality. In some cases high quality wines have been produced from uninoculated fermentations; however, the practice is not without risk. The main problem with natural fermentation is that it is unpredictable. One is not sure as to when it will start, how long it will take to complete, or if the fermentation will cease prematurely. Another danger is that off-flavors could develop and these may be difficult to remove. In such a case, the wine quality would be diminished. Because of the problems associated with natural fermentations, many winemakers inoculate the must with a pure culture of active dry wine yeast.

In the process of active dry yeast production, a yeast strain is first selected on the basis of several desirable enological characteristics. These include:

1. Ability to conduct vigorous fermentation
2. Ferment must to dryness
3. Good tolerance to ethanol
4. Tolerant to commonly used SO<sub>2</sub> levels
5. Produce no off aromas
6. Temperature tolerance
7. No or low foam formation
8. Flocculating potential

Once a strain is selected, it is commercially produced in active dry form. In the process of dry yeast production, they are grown under highly aerobic condition on a nutrient medium which is low in glucose. The aerobic condition (presence of oxygen) induces the formation of sterols in cell membranes, which is needed by the cells to withstand ethanol formed during wine production.

During the course of drying, the cell moisture is reduced from 70% to about 8%. The moisture needs to be restored by rehydration so that the yeast cells can become viable. Proper rehydration is the most critical step in using the active dry form of yeast strains.

There are many companies producing a wide array of yeast strains for the wine industry. These strains, in general, have good fermentation characteristics, but, additionally, may also have some special features to meet the winemaker's particular need.

Examples of yeast strains with special features and their application follow:

### **Lalvin DV 10**

- Useful as a base wine for sparkling wine production
- Rapid fermentation
- Sensory properties neutral
- In table wine, lower accumulation of SO<sub>2</sub> and acetic acid than EC1118
- MLF proceeds normally in wines fermented with DV10

### **Lalvin ICV D47**

- Flavor enhancement
- Richer mouthfeel/body
- Shows promise in barrel fermented styles of wine

### **Lalvin CY-3079**

- Suited for making barrel fermented wine with extended lees contact
- Contributes various aroma nuances

### **Lalvin ICV D254**

- Recommended for red wine
- Good body and mouthfeel
- Enhanced and complex fruit character

### **Enoferm Bordeaux Red**

- Recommended for high quality red wines

- Enhances aroma
- Minimum color loss
- Low VA production

In this article, some additional technical information about five new yeast strains is provided. These strains are commercially produced by Lallemand, Inc. of Canada. The information is presented here with their permission. The use of a producers name; however, does not imply endorsement of the product.

Before using these new strains, winemakers are encouraged to evaluate them on a trial basis under their operating conditions. Only after careful evaluation should the new yeast strains be used for wine production.

## **DV 10 *Saccharomyces bayanus***

### **1. Origin**

• A strain selected from isolates obtained from vineyards in Champagne. DV10 was selected by Station Oenotechnique de Champagne, Epernay. The strain was evaluated and approved for use in Champagne by the CIVC after trials during the 1990 and 1991 vintages with Chardonnay and Pinot Noir grapes.

### **2. Microbiological Properties**

- Classified as *Saccharomyces bayanus*.
- Killer activity present.
- Rapid start to fermentation at 15°C and will ferment at temperatures controlled at 30-32°C.
- Secondary fermentations at 10-14°C are successful.
- Nitrogen supplement may be required at high fermentation temperatures or in musts of low nitrogen content.

### **3. Physical Properties**

- Low foam formation in settled must.
- Yeast sediments to form compact lees

### **4. Oenological Properties**

- Alcoholic fermentation to 14-15% (V:V).
- Volatile acidity to 0.2 - 0.3 g/L.
- Sulphur dioxide accumulation negligible.
- Malolactic fermentation proceeds normal in wines fermented with DV10.
- Sensory properties of wine made with DV10 are neutral.

### **5. Application**

- Recommended for production of base wine for sparkling wine and general white wine production.

### **6. Usage**

- Use 25g of active dried yeast in 100 liters of juice.
- Rehydrate yeast in 5 times its weight in water initially at 40°C.
- Stir and allow to stand 15 minutes.
- Mix rehydrated yeast with juice to be fermented to adjust temperature to 15-20°C.
- Add temperature adjusted yeast suspension to juice to be fermented.
- It is recommended that white grape juice be inoculated at no lower than 15°C.
- When fermentation begins use temperature control to maintain required rate of fermentation.

## **ICV D254**

### **1. Origin**

• Isolated in 1987 from Shiraz fermentations in a Costieres de Nimes area winery. Dr. D. Delteil, of the ICV, selected ICV D254 after screening 3000 isolates, of which 450 were trialed for their oenological properties. The fermentations from which the isolates were obtained are typically high sugar and low nitrogen musts.

### **2. Microbiological Properties**

- Classified as *Saccharomyces cerevisiae*.
- Killer activity, ICV D254 is a neutral phenotype strain.
- Vigorous strain with a short lag time even in low nitrogen, high sugar musts.
- Faster fermenter than ICV K1 and ICV D47.

- Optimum fermentation temperature range 15-30°C.
- Complete fermentation at 30°C to 14% (V:V) ethanol.
- Commercial fermentations in France gave no obvious hydrogen sulphide problems when ICV D254 was used to ferment Shiraz containing 125 mg N/L, Merlot with 92 mg N/L, Cabernet with 105 mg N/L and even with a must containing 45 mg N/L.

### 3. Physical Properties

- No foaming.
- Very good sedimentation, a barrel fermented Chardonnay gave a clear ICV D254 wine after "Batonnage," every week, for many weeks.

### 4. Oenological Properties

- Alcoholic fermentation to 14% (V:V) ethanol.
- Very low sulphur dioxide, ethyl acetate and acetaldehyde production.
- In Chardonnay low production of higher alcohols and acetates of higher alcohols compared with ICV D47 and high production of ethyl fatty acids comparable to ICV D47.
- In red wines ICV D254 shows high extraction of anthocyanins and tannins, high anthocyanins/tannin condensation, high tannin polymerization and high tannin/polysaccharide combination.

### 5. Application

- Recommended for red wines such as Cabernet, Shiraz, Pinot Noir and Gamay.
- In red wines ICV D254 is found to give medium intensity, lifted fruit character, noticeably prune, blackberry and raisin, lifted balsamic character of cedar wood and juniper wood and lifted spicy character of black pepper and licorice.
- ICV D254 influences the taste of the wines described as a very high fore-mouth volume, big mid-palate mouth feel, high but smooth tannic sensation, low acidity with a long finish. The concentrated fruity character is noticed during the mid-palate and the spicy character at the finish.
- When ICV D254 is used to barrel fermentation Chardonnay the sensory analysis differs from ICV D47, ICV K1 and Enoferm M2 by higher butter, butterscotch, cream, smoke, hazelnut and almond characters and by lower pear and pineapple characters.
- Interesting complex Chardonnay wines have been produced by blending 20% ICV D254 wine with wine produced with ICV D47.

### 6. Usage

- Use 25g active dried yeast in 100 liters of juice.
- Rehydrate yeast in 5 times its weight in clean water, initially at 40°C.
- Stir and allow to stand for 15 minutes.
- Mix the rehydrated yeast with juice to be fermented to adjust temperature to 15-20°C.
- It is recommended that white grape juice be inoculated at no lower than 15°C.
- When fermentation begins then use temperature control to maintain required rate of fermentation.
- For red musts it is recommended that half the total dried yeast required in the ferment be rehydrated and added to the fermenter just prior to crushing. The remaining yeast should be rehydrated and added during crushing. This will ensure dominance of the ferment by the active dry yeast.

## ICV D47 *Saccharomyces cerevisiae*

### 1. Origin

- Isolated from grapes grown in the Cotes du Rhone region in France by Dr. Delteil, Head of Microbiology Department, ICV, Montpellier, ICV D47 was selected from 450 isolates collected between 1986-1990.

### 2. Microbiological Properties

- Classified as *Saccharomyces cerevisiae*.
- Killer activity present.
- Excellent dominance when inoculated into must containing high numbers of wild strains of *Saccharomyces cerevisiae*.
- Short lag time followed by a rapid and regular fermentation.
- Will tolerate a wide temperature range from 10 – 35 C.
- Nutritional requirement normal, however, Nitrogen supplement may be required in grape juice obtained from vines grown in areas of low Nitrogen nutrition.

### 3. Physical Properties

- Low foam formation.

- Yeast lees sediment well forming a compact layer, wine clarifies to less than 100 NTU (Nephelometer turbidity units).

#### **4. Oenological Properties**

- Alcohol fermentation to 14% (V/N).
- Volatile acid 0.2-0.4 g/l.
- Sulphur dioxide is not accumulated during fermentation and sulphur dioxide has been observed to decrease.
- Malolactic fermentation proceeds well in wine made with ICV D47.
- The sensory properties of the wine made with this yeast are described as having an enhanced flavour attributed to B-Glucosidase activity.
- Wine made with this yeast shows an enhanced mouth feel which is not due to glycerol formation, but thought to be from complex carbohydrates.

#### **5. Application**

- Recommended for use in making white and rose wines.
- Very good results achieved with barrel fermentation of Chardonnay.

#### **6. Usage**

- Use 25g of active dried yeast in 100 liters of juice. This amount of yeast will supply a minimum of 5x10<sup>6</sup> viable yeast per ml which will ensure a short lag time, dominance of the fermentation over wild yeast and result in fermentation to dryness.
- Rehydrate the yeast by suspension in 5 times its weight of clean water initially at 40°C.
- Stir and allow to stand for 15 minutes.
- Mix the rehydrated yeast with juice to be fermented to adjust temperature to 15- 20°C.
- Add temperature adjusted yeast suspension to juice to be fermented.
- It is recommended that white grape juice be inoculated at no lower than 15°C.
- When the yeast are actively fermenting temperature control can then be used to maintain the required rate of fermentation.

## **CY-3079 *Saccharomyces cerevisiae***

### **1. Origin**

A selection made by the Bureau Interprofessional des Vins de Bourgogne (V.I.V.B.) from yeast strains collected from Chardonnay fermentations in the Burgundy Region during the 1990 and 1991 vintages.

### **2. Microbiological Properties**

- Classified as *Saccharomyces cerevisiae*.
- Killer activity; CY-3079 is a neutral strain and not sensitive to the K2 toxin.
- Lag time short with implantation verified by PCR indicating above 80 percent of the CY-3079 strain. Implantation improves with increasing inoculum densities and juice low in wild yeast.
- Optimum fermentation temperature 15-32°C.
- CY-3079 ferments at an intermediate rate to dryness with alcohol resistance to about 14% (V:V).
- Volatile acid accumulation is low as is hydrogen sulphide. Musts containing low concentrations of amino acids require addition of Diammonium phosphate or Fermaid K.

### **3. Physical Properties**

- Low foaming.
- Good sedimentation and responds well to conservation on lees.

### **4. Application**

- Tank or barrel fermentation with extended lees contact.
- Recommended for production of Chardonnay wines for maturation and as a component in blends with wines made with yeast strains ICV D47, ICV D254, QA 23 or M2.
- CY -3079 respects the varietal aroma of the grape while the contribution by the yeast strain has been described as having components of fresh butter, toasted bread, honey, hazel-nut, vanilla and almond. Soil type and grapes from cool and hot climates influences the aromas observed.

### **5. Usage**

- Use 25g active dried yeast in 100 liters of juice.
- Rehydrate yeast in 5 times its weight in clean water, initially at 40°C.

- Stir and allow to stand for 15 minutes.
- Mix the rehydrated yeast with juice to be fermented to adjust temperature to 15-20°C.
- It is recommended that white grape juice be inoculated at no lower than 15°C.
- When fermentation begins, then use temperature control to maintain required rate of fermentation.

## **Enoferm Bordequx Red Saccharomyces cerevisiae**

### **1. Origin**

- A French isolate deposited with the Pasteur Institute. A copy of this yeast was introduced into the Californian wine industry and after many years of successful use an isolate was included in the UC Davis culture collection as UCD-725. Enoferm Bordeaux Red is an isolate of UCD-725.

### **2. Microbiological Properties**

- Classified as *Saccharomyces cerevisiae*.
- Optimum fermentation temperature 18-30°C.
- Killer sensitive yeast.

### **3. Physical Properties**

- Foam formation negligible.
- Settles well at end of fermentation.

### **4. Oenological Properties**

- Vigorous fermenter and will complete fermentation to 16% (V:V) alcohol.
- This yeast is associated with varietal flavour enhancement of red wines, adding considerable complexity without dominating the wine with yeast produced aroma and flavour compounds. Provides very good colour extraction. Highly recommended for Cabernet Sauvignon, Merlot, Zinfandel, Cabernet Franc and Petite Syrah.
- Low enzyme production by Enoferm Bordeaux Red during fermentation results in minimum colour decrease in red wines.

### **5. Application**

- Used extensively in California for production of premium red wines. Particularly useful for Cabernet Sauvignon, Shiraz, Merlot and Cabernet Franc. It is now used successfully in Australia and New Zealand.

### **6. Usage**

- Use 25g of active dried yeast in 100 liters of juice.
- Rehydrate yeast in 5 times its weight in clean water initially at 40°C.
- Stir and allow to stand 15 minutes.
- Mix juice to be fermented with the rehydrated yeast to cool to temperature of the musts to be inoculated.
- For red musts it is recommended that half of the total dried yeast required in a fermenter be rehydrated and added to the fermenter just prior to crushing. The remaining yeast should be rehydrated and added during crushing. This will ensure dominance of the ferment by the active dry yeast.

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