

Enology Notes #138

January 22, 2008

To: Regional Wine Producers

From: Bruce Zoecklein, Head, Enology-Grape Chemistry Group, Virginia Tech

Subjects Discussed in *Enology Notes* #138:

- 1. The Wines of Provence Study Tour, a Review**
- 2. Sustainability Issues in Winery Layout and Design program, March 7, 2008**
- 3. Energy Use and the Wine Industry**
- 4. Solar Energy**

All past *Enology Notes* newsjournals are posted on the Wine/Enology–Grape Chemistry Group’s website at <http://www.vtwines.info>.

1. The Wines of Provence Study Tour, a Review. The following is a general review of the France Study Tour of Provence I helped lead November 27-December 5, 2007. Specific vigneron visits and detailed notes on each visit will be posted and provided on my website at www.vtwines.info. Click on 2007 French Study Tour.

Languedoc. The visit began with a tour of several Languedoc vigneron visits. This area is considered by many to be the most innovative in France, producing soft rustic red blends based on several of the traditional Mediterranean grapes used in the southern Rhône valley, Syrah, Mourvèdre, Grenache and/or Carignan. The vin de pays wines are far less traditional and seem to dominate. The producers we visited were not concerned with not bottling under AOC appellation labels. The soils of the region vary notably from alluvial near the sea to more chalk, gravel and limestone. Many of the better vineyards, such as Mas de Daumas Gassac, that we visited are planted not on the plain but on relatively high, cool plateaus.

Institut Coopératif du Vin (ICV). We visited the ICV station at Maurin-Montpellier, which conducts research and extension activities for its members. In southern France, 80% of the wine is produced by ICV members. This impressive center has departments working in a number of areas including the following:

- Harvest preparation
- Maturity management and evaluation
- Wine production

- Organoleptic training and reviews
- Juice and wine analysis
- Regular technical meeting and bulletins

The Director, a colleague, Daniel Granes, who has presented in Virginia, showed us the facilities and hosted an evaluation of several applied research wines. The ICV approach involves practical assistance to its members. As such, Daniel spoke of the integration of the Institute's efforts in the 4 Ps: Packaging, Price, Promotion, and Product in the marketplace.

We evaluated a Syrah rosé yeast trial. Opale, a soon to be available yeast strain, was contrasted against K1 and D-21. The Opale-produced wine had a brighter red color (less orange), greater fruit intensity, and a much better integration of the textural and structural elements compared to the two others.

Another sensory evaluation involved Merlot wines produced with the addition of organic and mineralized N, with N plus gallo-tannin, or with the addition of an inactivated yeast addition product (Boosterrouge from Lallemand) during fermentation. The third wine was much fresher, more complex and very well integrated.

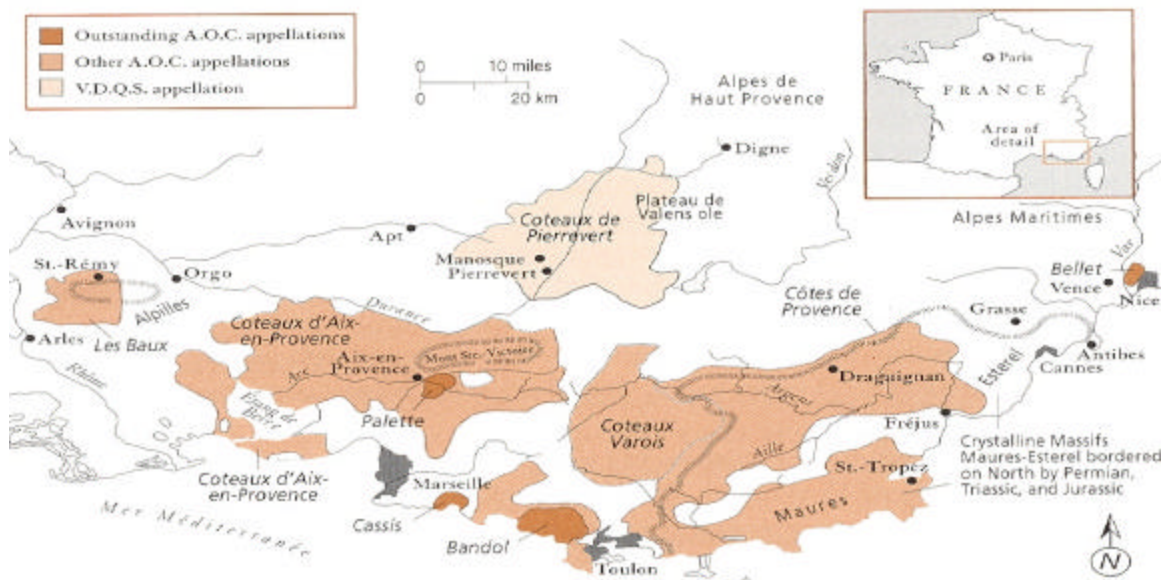
The ICV produces an impressive array of practically oriented information, much of which is available in English on their website www.icv.fr. I strongly urge you to visit their website!

SITEVI 2007. We attended SITEVI, the agricultural and enological exposé consisting of over 800 exhibitors from over 22 countries. An important topic discussed at this meeting was the increased levels of alcohol and pH noted in wines in the southern latitudes in the last few years. Certainly, alcohol increases go counter to consumer preferences as they are becoming more and more aware of campaigns against alcohol. Wine pH is also changing, increasing a few units with climate warming and increased fruit hang time to optimize grape and wine phenols and aroma/flavor. Tools to guide the winemaking process and help counter the extremes of alcohol and pH have appeared over the last several years and include reverse osmosis or nano-filtration, combined with osmotic distillation or contact membranes. Such technologies are currently not yet authorized by the OIV. It is now possible to fractionate the alcohol and aromatic components of wine. The question that the Europeans are asking is: is that a good thing? Is wine merely the sum of the assemblage of byproducts?

Provence. Most of our Study Tour occurred in Provence, a rich, diverse region, widely acclaimed for its sunny, warm climate. Its grape-growing tradition dates back thousands of years, and the wines have evolved to reflect the character of the region's terroir: fresh, lively rosés with a distinct and rather forceful personality, elegant, aromatic whites, and rich reds.

Bordered on one side by the Mediterranean Sea and on the other by the Alps, Provence's wine-growing region stretches some 200 kilometers from the Rhône River to Nice. The region is characterized by a patchwork of different soils and a diversity of landscapes. The leading AOCs of the region include Bandol (reds and rosés), Coteaux d'Aox-en-Provence, Côtes de Provence (white, red, and rosés), Les Baux de Provence (red and rosé) and Cassis (white).

Although warm and sunny most of the year, rainy periods occur in the spring, followed by a long, hot, dry summer. The long, dry spells during the growing season make moisture-holding in the soil bedrock very critical. The drying winds of the *mistral* are present throughout most of this region. In addition to the *mistral*, the mountain-sea relationship generates winds that blow from all directions. This has the benefit of desiccation and keeping fungal diseases minimal.



Provence is France's oldest vineyard, and the rosés produced there are France's oldest wines. The Phoenicians – colonists from the Greek mainland – were the first to introduce grape growing to the Marseille region some 26 centuries ago. Reportedly, the original wines were pale in color, similar to today's rosés.

Recognizing early the poor reputation of Provence wines, in 1931 a syndicate of growers in the Côtes de Provence began the bid to increase quality. In cooperation with the I.N.A.O. (the regulatory body founded in 1932) resurgence began based on increased knowledge of geology, hydrology, and microclimates of the region. The growers provided tasting evaluations and analyses to help improve quality. In 1953, the Côtes de Provence was awarded V.D.Q.S. status.

The Wines of Provence. As a result of geological and geographical diversity, Provence's vineyards are planted to 15 different grape varieties fermented using

the traditional technique of blending post-fermentation and aging. For the last few decades, Provence's reputation has been largely based on light, easy quaffing wines (80 percent is rosé) which pair easily with Mediterranean fare.

Provence rosés are categorized by light color, by US market standards. The rosés are generally blends of Grenache, Carignan, and Mourvèdre, and often described as pale, dry, aromatic and elegant. We found that the rosés were desirable apéritif wines, but worked nicely when paired with the traditional Provençal and Mediterranean specialties.

The white wines of Provence are traditionally blanc de blancs, usually refreshing and tangy or, when aged in oak casks, supple with good aromatic intensity. The whites (less than 5 percent of total production) are primarily Ugni Blanc and Clairette, with frequent additions of Rolle, Sémillon, Sauvignon Blanc, and Chardonnay.

Ugni Blanc (Trebiano) is France's most-planted white grape variety, yet is rarely seen on a wine label. This rather thin, acid wine is often used in distillation. Ugni Blanc is the main ingredient in French brandy production because of its good resistance to oidium (powdery mildew). High yields and high acidity may have helped establish it in southern France. It is sometimes called Clairette Ronde (although not related to Clairette).

Picpoul or **Piquepoul** is an ancient Languedoc grape variety that is commonly encountered in Blanc, Noir, and Gris versions with the white being the most planted. Piquepoul means 'lip-stinger', signifying the high acidity of its must. It is susceptible to fungal diseases. This, together with its relatively low yield reduced its popularity after phylloxera arrived. The variety's good tolerance to sand has made it a popular choice for the coastal vineyards.

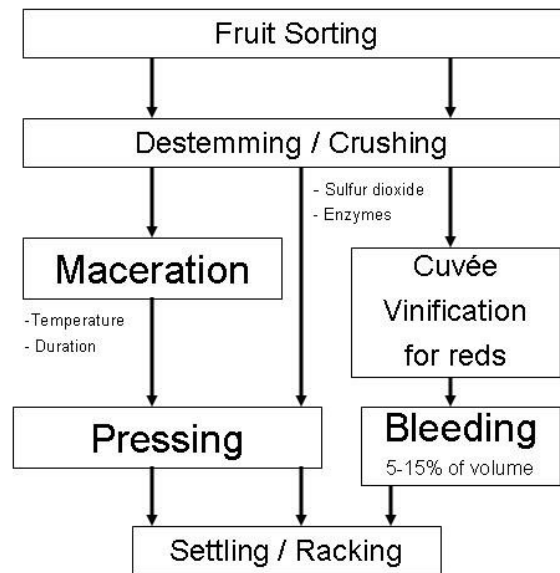
Rolle, the white grape variety traditionally most closely associated with Bettet is now increasingly grown in the Languedoc and Roussillon regions. It is often blended with southern varieties including Viognier, Rousanne, Marsanne, and Grenache Blanc. It is aromatic and crisp. It is reportedly the same as Vermentio of Corsica.

The red wines of Provence are produced mainly from Cinsault, Syrah, Mourvèdre, and Cabernet Sauvignon, especially in the north. In addition to rosés, the arid Mediterranean soils seem to produce a wide diversity of red wines ranging from light and fruity to rich and full bodied.

Coteaux d' Aix-en-Provence. The Coteaux d' Aix-en-Provence's vineyards are characterized by chalky clay soil, plentiful sunshine and regular gusts of Mistral winds. We visited the Centre du Rosé, a research centre at Vidauban dedicated entirely to rosé wines. The International Rosé Symposium (*Recontres Internationales du Rosé*) is held in Provence every two years. This symposium

brings together researchers, academics, journalists and producers from around the world to discuss issues regarding viticulture, enology and marketing of rosé wines.

The Centre du Rosé conducts impressive research on a variety of subjects of interest to rosé producers, including color standards and methods to attain those standards, effects of maturity on rosé color and aromatic quality, defining differences between production by pressurage vs. saignée (bleeding), defining optimum conditions for maceration, élevage sur lie, etc. as seen below.



The Centre du Rosé has developed color standards used to help define the relationships between cultivar, growing conditions, processing and longevity on color. It was interesting to note that their preferred recommended Rosé color was essentially salmon color, which possesses much less red vibrancy than many US producers would consider desirable. They believe this color helps to provide regional distinction and is consistent with their overall goal of optimizing the aromatic profile.



Much of the applied research conducted at Centre du Rosé is in the following areas:

- Evaluating enzyme formulations for targeted extraction of grape components
- Evaluating cultivar differences that impact extraction
- Evaluating the relationships between yeast strains and enzyme additions to maximize color stability
- Evaluating yeast strains that selectively adsorb phenolic compounds to impact rosé wine mouthfeel

A review of the current research activities of the Centre du Rosé is available at www.Centredurose.fr.

Coteaux des Baux. The Coteaux des Baux is at the foot of the Alpilles, a

cretaceous limestone massif. On the northeast flank of the Alpilles, Baux rises sharply 400 m above the Rhône Valley. The ancient village of Les Baux is on a spectacular spur overlooking St.-Rémi and vineyards in soils of limestone scree and terrace deposits. Excellent Cabernet Sauvignon blends and reasonable Chardonnays are being made here. Efforts by local growers have led to appellation status for the reds and rosés, which now go under the name Côtes des Baux de Provence. However, those which have more than 20 percent Cabernet in the blend are sold as *vins de pays*.

Côtes de Provence. The vast 20,000-hectare grape-growing zone of the Côtes de Provence appellation stretches from Aix-en-Provence to Nice, covering five geographic zones: the Mediterranean coast, the inland valley, the inland hills, the Beausset basin and the mountains of Sainte-Victoire. This extensive appellation produces some 80 percent of Provence wines.

Lying between Saint-Rémy-de-Provence and the Sainte-Victoire mountains, the vineyard area of Coteaux d' Aix-en-Provence covers 4,100 hectares and abuts Provence's ancient capital city. Founded by the Romans, Aix-en-Provence was home to King René, the "winemaking king," who developed the region's vineyards.

Cassis. The small fishing port of Cassis and this small appellation are threatened by urbanization from Marseille. The limestone cliffs are spectacular and composed of large fossil oysters called rudists. Ridges of rudist limestone are mixed with the gravelly soils in the 150-plus ha of Cassis vineyards. Below the cap rock of the cliff is a thick bed of clean sand. Cassis wines are mainly white, produced principally from Clairette, Marsanne, Ugni Blanc, and Sauvignon Blanc. The moist sea air of this region moderates the dry heat of mid-summer, aiding grape maturation.

Bandol. About 20 scenic miles east of Cassis is Bandol. The 900-plus ha of vineyards are located in protected coves in craggy hills of Jurassic limestones, sandstones, and conglomerates. Bandol produces red, white, and rosé wines. Many producers make their red Bandol wines from 100 percent Mourvèdre. They can have a tannic firmness with some capable of maturing for 10 years and more. Reportedly, the best areas of production are on soils washed from calcareous sandstone. Lesser vineyard sites are on stony, red clay soil and scree. Interestingly enough, the sandy soil has good water retention, an important characteristic, as there is very little precipitation from May to September. Mourvèdre likes deep, well-drained, but moisture-holding soil. We attended a wine festival at Bandol which allowed us to review the wines of 26 producers. There were interesting reds and spectacular rosé wines.

Bellet. In the coastal region toward the Italian border, the north-south ridges of the Maritime Alps come to the seas. In the environs of Nice, is the small (30 ha) special appellation of Bellet, planted on steeply terraced slopes of the Serre hills

overlooking the Var River. The soils are gravelly, sandy, with clay. Local viticulturists suggest that Bellet's quality is the result of the cooling effect from sea breezes during the day and cool air funneled down the Var Valley at night. In addition to the traditional grapes of Provence, there are exotic varieties from neighboring Italy that give interesting flavors to Bellet wines. The white wine is the most remarkable, being made principally from the Rolle (known as the Vermentino in Corsica). Blended with it are the Rousanne, Clairette and Muscat. The Fuella Nera (Folle Noire), the Braquet, Cinsault and Grenache are used for the rosés and red wines.

2. Sustainability Issues in Winery Layout and Design Seminar, March 7, 2008. The Sustainability Issues in Winery Layout and Design Seminar is scheduled for March 7, 2008 in conjunction with Wineries Unlimited. Registration information is now available at www.wineriesunlimited.com.

8:00 Registration

8:15-8:30 Welcome and Program Overview
Bruce Zoecklein, Virginia Tech, Blacksburg, VA

8:30-9:15 Building a Sustainable Winery: Principles and Applications
Andy Hall, Hall and Bartley Architecture, Santa Rosa, CA

9:15-10:00 Sustainable Winery Architecture, LEED
Joe Chauncey, Boxwood Architecture, Seattle, WA

10:15-11:00 Winery Energy Options, Solar
Gary Sheehan, SunTechnics Energy Systems, Paoli, PA

11:00-11:45 Creative Options in Integration of Winery Equipment and Design
Michael Shaps, Michael Shaps Consulting, Crozet, VA

11:45-12:00 Morning session Q&A

1:00-1:45 Sustainable Building Materials
Gary Black, Integrated Structures, Berkeley, CA

1:45-2:30 Cover Caves; Gravity Flow Design: Principles and Practices
Larry Ferar, Larry Ferar and Associates, Portland, OR

2:30-3:00 Cellars, Caves and Earth Sheltered Design
Larry Ferar, Larry Ferar and Associates, Portland, OR

3:15-4:00 Tasting Room Design Considerations
Kristofer Sperry, Kristofer Sperry Architects, Akron, OH

4:00-4:45 Winery Design Case Studies

Howard Bursen, Winery Design Consultant and Winemaker, Sharpe Hill Vineyard, Pomfret, CT

3. Energy Use and the Wine Industry. A portion of the above-mentioned program will discuss important sustainability issues, including energy use. In a recent study it was determined that the California wine industry is the biggest energy user among food industries in the state. With 2275 wineries as of late 2007, this represents a very large energy use sector.

California energy use is from the following categories:

- Imported coal
- Nuclear
- Natural gas
- Hydroelectric

Currently, only about 1-2% of the total energy used is generated from the sustainable sectors: solar, wind, biomass. The year 2006 had the hottest mean summer temperatures for the entire USA, putting a significant strain on the energy supply. California utilities have a desire to maintain at least a 7% reserve of energy to avoid brown-outs. Reduced reserves in southern CA have been occurring for several years and were exacerbated in 2006. This situation has motivated changes to come.

There are some significant energy security issues for the industry in the future, including, will there be energy available when needed? Will it be affordable? As such, a monitored response program in California to regulate electrical energy use will certainly impact the State's wine industry and may spread elsewhere. Features regarding this program include:

- Most large CA wineries participate currently
- Currently the program is voluntary
- Sign up will be required ahead of peak demand periods
- Will become mandatory
- Industry may be given 24 hour notice of restricted electrical use

All wineries must understand their total energy demands. The CA Energy Commission is imposing real-time pricing that will likely involve increased peak load pricing, more than 30¢/kWh vs. 10¢/kWh.

In addition to energy use, regulatory issues being discussed in California that could impact the entire US wine industry include the following:

- VOC – volatile organic compounds emission regulations

- Determination of CO₂ emissions from wineries and propose regulations
- Exchange CO₂ credits and credit banking
- Water use restrictions and its overall energy equivalent

Often in the USA there appears to be a double green mentality, the belief that one must trade economics for green construction and operation. Green vs. economics does not represent an either/or choice. They are mutually inclusive, not contradictory. This realization is becoming more evident. In the very near future all winery construction will likely be undertaken with a complete understanding of energy use and how energy demand will be met. Current and future wineries will need to know their energy use/ton of grapes or per case of wine produced. Such metrics will be required to assess energy needs, and required to adopt best practices.

The CA Sustainable Winegrowing Alliance has an assessment program and workbook for sustainable review and assessment. Their workbook allows comparison with other operations in the state of California and divides wineries based on size. It also lists winery practices related to efficiency. Additional information is available at www.sustainablewinegrowing.org.

Sustainability also includes economic sustainability. Saving fossil fuels is cheaper than buying fuels. This dichotomy will become very dramatic in the near future. Therefore, energy efficiency is a vital step in energy systems which will generate the biggest bang for the buck.

Sustainability also means reducing risk and liability of businesses. Current and future wineries should undertake the following steps (adapted from The CA Sustainable Winegrowing Alliance) to plan to help maximize their sustainability.

1. Conduct a sustainable winegrowing assessment. Get or conduct an energy audit that determines energy consumed per ton of fruit processed or per case of wine. Determine the extent of energy efficiency per major operation.
2. Build an energy conservation plan, methods of monitoring, established goals and expected results. This should include refrigeration system efficiency and energy efficient technology, including evaporative condensers, additional heat exchange surfaces, etc. Tank cooling and heating should be monitored. Tank insulation can substantially increase efficiency. Motors and pumps should be monitored as well as heating, ventilation and air conditioning systems. Replace all incandescent lighting with energy efficient fluorescent light bulbs. Use automatic controls for room lighting that turn on and off as needed. Light only those areas needed. Consider constructing radiant barriers for reducing heat transfer across air spaces such as roof decks and attic floors. More about radiant barriers is available at www.ornl.gov/roofs+walls/facts/index.html.
3. Create an integrated energy and water management plan.

Several good websites provide on-line assistance in energy conservation including www.flexyourpower.com.

4. Solar Energy. It is estimated that solar energy could generate 20-40% of our energy needs by conversion of 15 to 20% of the sun's rays to electrical energy. The current problem with solar is cost, technology, and the availability of silicon for solar panels.

A 2-4 kWatt system needed to power an average size home costs more than \$15,000. Cost of solar energy has been off-set by state and federal tax incentive programs. Unfortunately, not all states provide tax incentives. However, most states require electrical utilities to buy excess solar electricity that is created. There has been a 600% increase in the number of solar panels installed in the US just in the last two years, although the US is somewhat behind Europe in this trend. World-wide, solar represents a \$38 billion industry.

Solar power works on a basic principle. Electrons from a silicon molecule are ejected when struck by a photon from the sun. These electrons are collected as DC current and go through an inverter to become AC, or household-type, electrical current. Silicon is somewhat unique in its ability to share electrons. Because the global demand for silicon is so high, its availability is becoming a limiting factor in solar energy use.

New technologies may soon be available which could make solar energy even more attractive. Titanium oxide-containing paints (solar paints) contain small particles of TiO_2 . This positively charged surface coating allows for easy electron migration and may, one day, supplement or even replace photovoltaic cells.



All past *Enology Notes* newsjournals are posted on the Wine/Enology – Grape Chemistry Group's website at: <http://www.vtwines.info>

To be added to (or removed from) the *Enology Notes* listserv, send an email message to rakestra@vt.edu with the word ADD or REMOVE in the subject line.

Bruce Zoecklein
Professor and Head, Enology-Grape Chemistry Group
Department of Food Science and Technology (0418)
Virginia Tech, Blacksburg, Virginia, 24061
Enology-Grape Chemistry Group website: www.vtwines.info