

Write Up12/8/06

Wines from the Land of Dragons

**Bruce Zoecklein, Head, Enology-Grape Chemistry Group
Virginia Tech**

People associate China with many things, but few link the country with wine. However, with the world's fifth largest vineyard area and the seventh largest production level in 2004 (OIV), that may change. In November 2006, I was invited by the Chinese government to lecture at two universities (Agricultural Research Station of Guangdong Province in Guangzhou, and at the China Agriculture University in Beijing) and tour Chinese wine regions. The following is a review of that visit and the Chinese wine industry.

China has a long history of wine production, although exactly when the Chinese began to produce wine is a matter of speculation. Chinese literature accounts the introduction of grapes from modern Uzbekistan during the Han dynasty (136 to 121 BC) and their planting in Xi'an, the legendary eastern terminus of the Silk Road near China's Yellow River. In 1980, a 3000-year-old, tightly sealed copper container was unearthed in an ancient tomb from the Shang Dynasty (1554-1045 BC) in China's Henan Province (south of Beijing). Scholars have determined that it contained grape wine, likely made from one or more of the indigenous, wild varieties.

The modern wine era in China began with the communist takeover in 1949. State-owned wineries were built and expanded, and the blending of grape wine, fruit juices, water, fermented grains, coloring and flavoring agents became common. As such, the term *wine* traditionally has a different meaning in Chinese culture than in the west. *Jiu*, which literally means alcohol, was used on all labels until recently, not allowing for the distinction among alcoholic beverages. Rice-based alcohol is referred to as wine, as are various fruit alcohol concoctions, including white spirits (*baijiu*). Modern Chinese winemakers now make an effort to specify grape wine by labeling with the term *putajiu*. This is helping, but the term *wine* is still widely misunderstood in China.

China's Four Modernizations Program, launched in 1978, opened the door for the modernization of the country's wine industry through international involvement. The Chinese government began emphasizing wine to help quench the national thirst for alcoholic beverages. Indeed, the Communist Party decreed that consumption should change from grain liquor to fruit liquor in 1987. The 1990s saw a decline in state-owned wineries, but an increase in foreign investment, modernization, and western technology.

More than 100 wineries have been established since Premier Lu Peng's exhortation at the National People's Congress in 1996 that Chinese drinkers must reduce their consumption

of grain alcohol, and switch to wine. Since that time, the government has encouraged state-run 'wine manufacturing plants' to grow western grape varieties.

With a country as vast as China, it is easy to imagine a wide range of climates and soils suitable to wine production. My first stop was at the Agricultural Research Station of Guangdong Province in Guangzhou, in China's southern Canton region. This semi-tropical zone does not concentrate on viticulture, but sericulture, the production of silk. Over thousands of years, intensive breeding has rendered the silk moth (*Bombyx mori*) a blind, flightless, egg-laying machine, whose larvae hold the secret of silk production. The Chinese discovered the potential of its ancestor, a wild, mulberry leaf-eating moth unique to China. For 3000 years, China (known in the west as Seres, or Land of Silk) had a monopoly on silk production. While China is no longer the only producer, silk today represents a very important agricultural commodity for China. The Agricultural Research Station of Guangdong Province is the research center concentrating on breeding of the silk worm and on the important by-products of silk production. These by-products include mulberries, nutritionally-based products, juice and, of course, mulberry wine. I gave several lectures on wine technology, and toured their extensive wine research labs and experimental winery devoted to mulberry wine research.

From Guangzhou, I traveled some 2400 km by train to the Chinese Agricultural University in Beijing. In 2003, the university established the country's first PhD program in Enology and Viticulture. With extensive support from some of the major wine producers in the country, including Great Wall Winery, this program is thriving. The university has a pilot winery and research facilities that are quite impressive. With four full-time faculty and about 50 graduate students, the program is providing the industry with the technically trained personnel needed to grow and develop production. I lectured on grape-derived aroma and flavor precursors, and evaluated many of their experimental products. I also lectured to the graduate students in English. English competency is a requirement for the Chinese Agricultural University Enology and Viticulture program.

From Beijing, I visited several wine regions. China has more than 300 wineries. Most of this development has been in the North Central Heartland areas near Beijing, in the eastern maritime region of Shandong, and in the Inner Northern region of the country. The industry is dominated by six large producers who account for about 55% of the total production. The average capacity of Chinese wineries is approximately 2000 tons, with 70% of the producers under 1000 tons. The more predominant wineries include Changyu, Great Wall, Dynasty, and Dragon Seal, all producing over 10,000 tons. Wine production in China in 2005 was 434,000 tons, an increase of 14% from 2004. While small compared with other alcoholic beverages, it represents a substantial increase.

Some wineries still use flavor essence, ethyl alcohol, sweetening agents, and water to produce wines. This has been the motivation to attempt to establish standards. At a wine conference in Shandong Province, participants discussed the establishment of an AOC-type system. New standards are evolving, including premium wine and ice wine; the latter, produced in the extremely cold Xinjiang Region, is abundant in stores in most big cities. Regulations are being put into effect to control raw materials, regional identity,

variety, and vintage. Despite some opposition to geographic indicators as a means of wine classification, local branding has become a trend, with the expansion of some estate-branded wines. One winery I visited, Great Wall, is leading the market in estate wines. Certainly, domestic wine producers are starting to change marketing strategies. Changyu Wines has established the first estate wine club in China. They and others are attempting to break out of the traditional, for example, by selling entire barrels of wine at a time. The Huadong Winery, established in Shandong Province in 1985, was one of the first wineries to attract attention. It was the first Chinese winery with a varietal label, and the first to vintage date.

China has 26 indigenous vine species and hundreds of grape varieties. These are used to produce mainly low-end wines. Widespread introductions from Russia, including Muscat Hamburg and Rkatsiteli, along with Italian Riesling, make acceptable, if not noteworthy, products. In Shandong Province, early vineyards were developed from a diverse selection of wine grapes introduced mainly from Europe. Among the most common are Cabernet Sauvignon, Cabernet Franc, and the mysterious Cabernet Gernischt and Welchriesling. Cabernet Gernischt is a red wine grape variety used in China and believed to be of European origin, similar, if not identical, to Cabernet Franc. The name may be a misspelling of the Cabernet Gemischt, once used in Europe. It was imported into China in 1892, and is used both as a varietal wine and a blending component. Shandong Province is roughly at the same latitude as California. Cool Pacific breezes moderate the temperature, which ranges from about 3C in winter to 26C during the summer. Monsoons come from the South China Sea, although spring is usually dry, and summers and autumns wet. Therefore, fungal growth is a problem, with rainfall averaging about 700 mm (27 inches) between June and August.

Like many regions in the world, China's initial plantings were on flat land with fertile soil, poor drainage, and poor ventilation. Overcropping is a large problem, impacting quality. In the Shandong peninsula at Pingdu, the eastern range of the Dazashen Mountains, with its south-, southeast- and southwest-facing slopes, is being planted. This area is gaining a lot of attention due, in part, to decomposed granite soils overlaying a limestone bed which, for the most part, is low in nutrients and well drained.

China's parallel system of market-driven and controlled economy, along with very strong farmer traditions may limit the pace of change. Traditionally, all grape varieties (for wine and table) were grown in a fan-type trellis system with little canopy management. On the fertile valley floors, this results in dense foliage. High humidity and excessive yield increases the fruit rot potential, which motivates growers to harvest immature fruit. The vast majority of vines I saw were ungrafted. Grapes are supplied by individual farmers who usually work less than an acre. With the abundance of cheap labor, as expected, all viticultural activities are performed manually.

In Hebei Province, not far from Beijing, vines are trained to a single and double cordon system, and buried in the winter, due to temperatures between -10 and -20C. The soil in this region is very sandy, with a high pH. Rainfall is about 400 mm. Here they use the so-called Dragon system. Vines are trained to single or multiple cordons just above

ground level. Each cordon, or dragon body, bears dragon claws (canes) which are trained vertically about 50 cm apart.

Winemaking in China is an interesting blend of the ancient, Old World and modern chateaux style wine crafting, often at the same facility. Naturally, with a diverse industry, there is a large variation in production practices. The important feature for most Chinese wineries is to keep production costs down for standard volume wines.

Most of the higher-end products are the result of either joint ventures (which may mean a consultant on economic linkage) with Europeans or South Americans, or French production practices and philosophy. The majority of the processing equipment I observed was French, with premium wine production rather minimalistic. I received a broad response to my questions regarding yeast additions: some do, but most suggested they do not. Sulfur dioxide was the only common addition product. Virtually every winemaker harvests based on sugar; measures of TA, pH, and aroma evaluation are not common, or of common concern. Fermentations are conducted in modern stainless steel, concrete, French 200-L barrels, or in some cases very old wooden (oak) fermentors, with or without temperature control. Red wine cap management is not a large concern and consists almost entirely of pump over. Practices such as cold soak, bleeding, and délestage are not practiced, and none of the producers I visited used extended maceration. Great Wall Winery is typical. They ferment their premium reds to dryness, rack into Allier barrels for 12 months, and bottle aged for one year prior to release. White wine production is made by crush and press (sometimes in screw-type), usually settled, not always with refrigeration, without fining agents, racked, and fermented. Traditionally, fermentation did not occur in oak. Some Chardonnay producers are using oak fermentations.

The bigger wineries, as expected, have high-speed, modern bottling lines. However, virtually every winery uses low grade corks, often agglomerated, even for their premium wines. As a result, shelf life is limited, which did not seem to be a large concern. Established Chinese wineries, such as Changyu, Great Wall, and Dynasty, have found a home for the mid-level wines, principally in the eastern modern cities of China and the Chinese towns of the world. They hope to expand beyond those limited markets, certainly in the West. Currently, quality and packaging are both constraints for sales in the West.

Dry wines have overtaken sweet and semi-sweet wine production in the past 12 years. Sales of still red wines represent about 70 percent of the total, which seemed odd, since I do not associate Chinese food with red wines. However, as I learned, food and wine pairing, while starting to catch on in the more affluent eastern cities, is not part of Chinese culture. Red color represents happiness, good luck, strength, and power, while white is the color of death in Chinese culture. This, coupled with interest in health, may suggest reasons for the trend towards more red wine produced than white. Additionally, red wine and health is promoted by the government and Chinese society is very interested in the relationships between food and health. White wines are becoming popular in the cities of southern China, perhaps because of the abundance of fresh seafood in the regional diet. Traditional white wines made from Dragon's Eye without the aid of

modern technology, including refrigeration, have not always been that noble. Premium wineries are changing that pattern and many have planted Chardonnay.

China can be considered both a western wine marketer's dream and nightmare. Wine consumption is rising faster than domestic production, currently allowing imports to make up the balance. Beginning January 1, 2004, Chinese tariffs on wine have fallen from 44.5% to 14%. This dramatic reform was brought on as part of China's accession to the WTO, and has substantially changed the domestic wine market. Given the traditionally low incomes, the majority of wines must be sold at low prices, a problem in light of the fact that taxes account for about 50% of the retail price of imported wine. Domestic wine can sell for about 20 RMB/L, or about \$4 equivalent, with the very expensive about \$20. The government estimates that within eight years, China's population will be 1.4 billion, increasing at approximately 14 million per year. This represents a lot of potential wine drinkers. The Chinese do drink alcohol, but not much wine (per capita consumption is about 0.2L vs. 80L for the Italians, for example). With the country's growing affluence, trend of eating out, and some trends towards Western-type foods, increasing wine consumption will occur. The question is, by how much?