

WINE GRAPES FOR OKLAHOMA

BACKGROUND

One of nature's gifts is the grapevine. The fruit of this plant has been used since earliest times for food, and during the last four, and possibly up to eight millennia, for making wine. Dried grapes, or raisins, have long been used because they could be stored without spoiling. Grape juice was found to be a delicious drink, but it could not be kept fresh. Under normal conditions the juice soon ferments into wine or turns into vinegar.

Earliest winemaking efforts were in Europe and Asia, mostly in the Mediterranean Sea area. The varieties of grapes used were growing wild in the Caucasus area or were developed from these wild vines. They were of the **vinifera** species. Some of these varieties that were grown two thousand years ago are still grown today.

Louis Pasteur studied the winemaking process during the nineteenth century to solve problems encountered in winemaking efforts in France. Before this, there was little understanding of the basic process. Pasteur's studies showed that the conversion of juice to wine resulted from the action of enzymes in yeast in breaking down grape sugar into carbon dioxide and alcohol. Yeast occurs naturally on grape berry skins. Also revealed was that pasteurization of grape juice would kill the yeast, as well as bacteria, rendering the juice stable and fit for bottling.

VITICULTURE IN AMERICA

European (vinifera) grapevines were brought to America in the year 1619. Investors in England knew that wild grapes were abundant in America, and reasoned that the soil and climate would be favorable for developing a wine industry that could free England from depending on France and other countries to satisfy its considerable thirst for wines. They didn't know that native North American pests such as the phylloxera root lice and other insects, as well as fungus diseases and viruses not present in the Old World, would prevent successful growing of vinifera varieties in the eastern United States.

But on the Pacific Coast, Spanish missionaries planted the Mission grape, a variety with much vinifera blood, and grew it successfully. The phylloxera and most Eastern U.S. pests were not present in California. Today, viticulture and winemaking are important West Coast industries.

The climate of the Pacific coast resembles the Mediterranean climate in its dry, warm, but not hot, summers and wet, mild winters. East of the Rocky Mountains the American climate is classified as "continental", with hot, mostly wet summers and cold, dry winters. This area has both climatic and biologic environments that the Old World grape varieties never encountered at

home, and to which these grapes have not developed means of adaptation and survival.

The forty-eight state area of the U.S. is home to approximately thirty native wild grape species. Nine of these are native to Oklahoma. When efforts to grow vinifera in the East failed, attention turned to the wild vines. These could be grown successfully; but the taste of the fruit and wine was generally strong or otherwise less appealing than that of vinifera fruit. This prompted an active period of cross-breeding of native vines with European varieties to produce hybrids which would be both environmentally adapted and capable of producing good wine. These “American hybrids” are made into wines that are in more demand at some wineries than wines made from vinifera grape varieties.

Initial breeding efforts were made in Northeastern U.S., where the native labrusca grape is the dominant species. This resulted in successful varieties (such as the Concord) which were suitable for juice or jelly. This species contains anthronilate, a chemical which imparts to wine a “foxy” taste considered desirable by some, but not preferred by those who have a wide tasting experience.

Late in the nineteenth century one individual, Dr. Thomas V. Munson of Denison, Texas, made and published a detailed study of the grape species of North America. Armed with the information he had developed, he undertook an ambitious grape breeding program in which a number of American species vines were crossed with European (vinifera) vines. Also, some American species were crossed with other American species. Unfortunately for wine drinkers, Dr. Munson had only a tepid interest in wine. The vinifera varieties used were mostly table grapes rather than wine grapes. Therefore, real progress in wine grape development was stifled by lack of an effort to capture wine quality characteristics while excluding species with negative wine influences.

NEW WINE GRAPES

Just prior to Dr. Munson’s activity, American vines were introduced into France. These vines were infested with phylloxera, which when introduced into French soil, quickly proliferated, attacked the defenseless vines, and soon decimated the vineyards of Europe.

Two approaches to combating the phylloxera were developed. The first was to import large numbers of American vines (resistant to phylloxera) to serve as rootstock on which to graft wood of the European vines. Both Dr. Munson and his contemporary, Herman Jaeger of Southwest Missouri, made important contributions to this program by exporting numerous wild vines to Europe.

A different approach consisted of cross-breeding European wine grapes with American varieties containing one or more species with phylloxera resistance or tolerance. This

hybridizing method was adopted by Messrs. Baco, Seibel, Seyve and others to create thousands of new varieties which could be planted directly in the soil. They were called “direct producers” in France. In America we call these varieties the French hybrids. They were popular with French growers because of ease of propagation, high crop yield and improved resistance to disease. Herman Jaeger contributed to this breeding program by crossing wild vines of the *aestivalis* and *rupestris* species to produce Jaeger 70, later named Munson. This variety was probably used more than any other by the French hybrid breeders. Wine made from grapes of Jaeger 70 is surprisingly mild for a variety containing no *vinifera* genes. This red wine has been available at the Post Familie Winery at Altus, Arkansas and is called “Munson”.

The quality of wine made from French hybrids is generally inferior to wine of the better *vinifera* varieties. The French wine industry authorities now allow only a few of these hybrids to be grown. One may find it peculiar that the *vinifera* varieties used in the hybrid crosses were seldom of the “noble” varieties of excellent repute grown in France, such as Cabernet Sauvignon, Chardonnay, Merlot, Pinot Noir, Syrah, Grenache, and Sauvignon Blanc. One explanation is that the hybridizers often were trying to satisfy a specific local need such as providing a grower the means to produce high volumes of cheap, ordinary wine for the local area market.

The French hybrids do have a definite application to American growth conditions because of American species genes in the crosses. Several of these are grown in the U.S. today east of the Rocky Mountains. In most cases these are white-fruited varieties. Examples are Vidal, Seyval, Villard Blanc and Vignoles. All of these varieties can be vinified into good wines. These are grown in several states, including Oklahoma.

In recent years high quality wine grape hybrids have been bred at the New York State fruit experiment station by crossing superior *vinifera* varieties with well adapted American varieties. Most of these are white-fruited varieties adapted to Northeastern U.S. climatic conditions. They may not be well adapted to the hot environment of Oklahoma summers, but should be tested. Several other states have wine-grape breeding programs.

GRAPE VARIETY DEVELOPMENTS IN OKLAHOMA

Oklahoma A&M College (now OSU) undertook a grape breeding program in the 1930's. In Phase I, well-adapted Munson varieties were crossed with older American hybrids. Emphasis was on providing Oklahoma farmers with adapted varieties to produce fruit suitable for jelly, juice or eating. No thought was given to creating wine grapes. Most of these hybrids inherited a measure of foxiness derived from *labrusca* grapes. This breeding effort was supervised by Professor Herman Hinrichs.

In Phase II, Munson hybrids were crossed with French hybrid varieties. Again, there was no intention to create wine grapes. The Phase II hybrids were much lower in *labrusca* content but did not contain genes derived from superior wine grape varieties. Several Phase II varieties were vinified into acceptable wines. The most notable of these is black variety #308, later named the Rubaiyat. Rubaiyat is being grown on a trial basis by some Oklahoma growers.

The only wine-grape breeding program conducted in Oklahoma, as far as I know, is my own hybridization program begun in 1975 and still in progress. The varieties used in my breeding work include Munson hybrids, Oklahoma A&M hybrids, French hybrids, *vinifera* varieties, and several species of wild grapes, particularly *lincecumii* (*aestivalis*) and *acerifolia*. Wild grapes were obtained from sites in Oklahoma, Missouri, Kansas and Texas or from germplasm repositories of fruit experiment stations.

Evaluation of results obtained after fifteen years of activity led to the conclusion that my breeding program had made little or no progress in developing a well-adapted variety capable of producing good wine. It appeared that the hybrid varieties used in my breeding contained genetic flaws (poor ancestry) and that the wild flora were not superior specimens of their species. My conclusion was that success would depend on crossing known superior varieties of *vinifera* wine grapes with the best wild vines that could be found and tested.

Fortunately, over thousands of years of wine-growing activity, superior varieties of *vinifera* have been developed and identified. But finding and identifying the best specimens of wild vines is a daunting task. This requires years of scouting numerous wild vines in the summer, returning to take vine wood in the winter, and growing the variety for several years to observe performance. My searches of areas with wild vines were too limited to find one specimen with all the desired characteristics.

About this time I met John Grinstead, a grape breeder from Rolla, Missouri. He used only wild species in his breeding program. He was a forester who developed an interest in wild grapevines observed in government forest preserves over a twenty-five year period. He gave me the wood of the best vine he had found, a vine of the *aestivalis* species. I grafted this to a growing vine in Oklahoma City in 1990 and began pollinating the blossoms with Ruby Cabernet (*vinifera*) pollen in 1991. In 1992 the breeding continued with the same wild vine using pollen from Merlot and Cabernet Franc.

From these efforts one vine was selected from the 1991 crosses, and six were selected from 1992 crosses, for further evaluation and testing. These seven varieties have been planted at the state fruit experiment station at Mountain Grove, Missouri. Several of these are also planted at the OSU experiment station at Perkins, Oklahoma. The performance of these varieties is being observed by the stations' personnel. Several of these varieties appear to be decidedly superior to varieties that I had developed previously. All are black-fruited varieties. Four of these varieties have been planted at the Dunkin farm near Wagoner, Oklahoma.

Vinifera varieties have been widely planted in recent years in Oklahoma, including vines planted at the Dunkin farm. Greatly increased knowledge of environmental factors and improved methods to combat diseases and pests, discovered after the early American colonial growing failures, have made it possible to grow *vinifera* with success in some but not all,

continental climate areas in America. Testing of vinifera in Oklahoma has generally been of short duration; therefore, many questions remain to be answered in the vineyards and wineries. The vinifera vines planted in Oklahoma are mostly on their own roots. Some are grafted on rootstocks.

STATUS OF VITICULTURAL ACTIVITY IN OKLAHOMA

Until recently there was negligible acreage planted to wine grapes in Oklahoma. Only two licensed wineries were operating and are still in operation, namely Cimarron Cellars near Caney and the Bartenek Winery in Enid. Pete Schwartz operated a winery in Okarche for several years.

In 1995, Max Knotts of Oklahoma City and others established a grape and wine organization named "The Oklahoma Grape Growers and Winemakers Association". Max received assistance from Tom Knotts, Bob Bartenek, Richard Sias and possibly others in various aspects of this activity. Initial membership of about fifteen persons has grown in number to approximately two hundred. From this membership there are now about one hundred with vineyards in Oklahoma. There are thirty-four active wineries. This is as of March 2006. The number of wineries has been increasing.

Both hybrid and vinifera grape varieties are being grown by Oklahoma growers. Varieties include American hybrids, Munson hybrids, OSU hybrids, French hybrids, vinifera varieties and probably others. Experience in growing and vinifying these grapes is not yet sufficient to establish which varieties will consistently produce a good crop and can be vinified into an appealing wine. This will require several more years. Some of the wine is being sold in Oklahoma liquor stores, but most is marketed on winery premises.

GRAPE BREEDING

Grape breeders (hybridizers) seek new, superior varieties of grapes. They do not and cannot create a grapevine or grape variety. Creation occurs by the means that nature has provided to continue the existence of a life form. But breeders intervene to point this process in a desired direction. In this way the creation of new varieties with improved performance may be accelerated compared to the results from an unfocused procedure.

In the natural breeding process of plants, genes of one parent (male) are combined with genes of another parent (female). The genes which are combined during the fertilizing of the female flower are chosen by nature in random fashion (by chance). The attempt to develop improved varieties is made difficult by the need to manipulate the great many genes that control the traits of the plants. The randomness of genetic combination in grape crosses results in

creation of many new plants, each of which is different from all the others. Most of these show poor or mediocre performance. Normally a much improved or superior variety is found only once in thousands of new offspring.

For grapes, the breeding operation consists of, first, choosing the varieties to be the parents and making the plants available. Pollen from one vine (either hermaphrodite or male) is applied to the flowers of a female (or emasculated) vine. Pollinated clusters are bagged to exclude other pollen. Grapes of these clusters are harvested when ripe, and the seeds are extracted from the pulp. Normally the seeds are kept in dry storage for two to three months. Then they are kept in moist peat moss for ninety to one hundred days at 35EF to 45EF. Finally the seeds are planted either in flats or pots, in potting soil. When several leaves appear on a seedling it is planted in the ground. The plants which survive are observed for several years. Any superior specimens are kept for further observation and testing. Inferior plants are eliminated.

In recent years, genetically transformed grapevines have been developed in laboratories throughout the world through genetic engineering technology. Grapevines have been genetically engineered to improve disease resistance and insect resistance. To accomplish this, specific genes are transferred into cultures of grapevine cells. These genes are available from other grape varieties or from other plants. Transformed varieties are being tested in France and in the United States. Attempts are being made to create genetic maps of grapevine chromosomes to isolate important genes.

George Girouard
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