

Summary of Mediterranean Winegrape Cultivar Evaluation at UC HREC, 2000-2004 Growing Seasons

Introduction

Much of California's Wine Industry is based on cultivars that originated in Northern European climates that are considerably cooler than the regions where grapes are grown in California. The "International Varietals" which include Cabernet Sauvignon, Merlot, Sauvignon Blanc, Chardonnay and Pinot noir are most commonly grown in Northern France. Heat summation (temperatures above 50 degrees F) data indicate that these cultivars are best suited to cooler winegrowing regions in our state that have degree summations between 2200 to 2800 hours. The interior coastal valleys of the North Coast Viticultural Area and other parts of the Coast Range (Livermore, Paso Robles, Santa Ynez) are much more similar to Southern Europe, including the Mediterranean Region (Winkler, 1962.) Very high quality wines are made throughout Southern Europe, with none based on the dominant wine grape cultivars presently grown in the North Coast (Robinson, 1986). There is a myriad of genetic diversity with over 230 cultivars grown in Italy alone (Anderson, 1990). Finding new cultivars that produce high quality wines in the warmer portions of the North Coast will allow wineries to offer consumers a wider array of products and diversify the market place for the wine industry, rather than continuing with a narrow cultivar base presently being used (Chardonnay, Cabernet Sauvignon and Pinot Noir.) Our trial was initiated in 1994 to evaluate 20 wine grape cultivars that are known to produce quality wine in the Mediterranean region of Europe. While information on wine is ample, information on the viticulture of these cultivars is often extremely limited, even in the language of these grapes' native region.

Materials and Methods

Cultivars were chosen for the trial based on the availability of plant material, and the potential for quality wine based on samples evaluated from these cultivars' country of origin. Regional families of vines were considered. Following are brief descriptions and areas of origin:

Southern France: The Rhone Valley region is well known for high quality and reasonably priced wines that are made both as blends and as single cultivars. The region is far enough north that crop load must be carefully regulated (by law) to insure that fruit ripens. Included in our trial were the following:

Syrah: A productive red wine grape capable of producing long lived red wines with good tannic structure, acidity and color. Some times lightly colored juice is removed from freshly crushed wine to make a rose wine, which also allows concentration of color and strength in the remaining must.

Cinsaut: A large berried red grape that is often used for rose wines, and also for blending with more tannic cultivars to add fruit and to make the wine more drinkable when young. Tannins and color are light. The fruit was also used as a table grape.

Viognier: A low yielding white grape with a very floral aroma (due to high terpene content) which ripens at high sugar levels, making wines with high alcohol content and good acidity.

Roussanne: A moderate yielding white grape with good acidity and tannic structure used to make full bodied and long lived white wines.

Marsanne: A high yielding late white grape with large clusters that makes neutral, mineral flavored wines that age well, and blend well with Roussanne.

(Mourvedre and Grenache are also red wine grapes of this region, but are native to Spain.)

Northern Italy: Italy is a country of tremendous diversity. The Piedmont region produces the highest quality wines of Italy in relatively large quantities. The climate is warm, continental and humid. Most cultivars are vigorous and productive, with long trailing canes and often, large clusters of fruit. Selections from this region includes:

Nebbiolo: A red grape considered to have the highest quality potential of the region. Wines are traditionally light colored, tannic and aromatic, capable of aging for decades. Nebbiolo is one of the earliest grapes to break bud and one of the last to ripen.

Freisa: A red grape with good production, moderate color, and very fruity in aroma used to make both sparkling sweet wines and wines to be consumed young.

Dolcetto: A very productive red grape that makes deep colored wines with good tannic structure consumed when young.

Arneis: A vigorous white grape with small clusters capable of producing fresh, easy to drink white wines with floral aromatics, good structure, moderate acidity and moderate alcohol.

Cortese: A productive white grape yhat makes mineral wines with good structure and acidity.

Central Italy: Tuscany, located on the west coast of Italy on the Mar Tirreno is noted for its lovely landscapes, wholesome and tasty cooking, and the Chianti area, famed for its blended wines. On the eastern Adriatic coast, Abbruzzi is an area not noted for tourism, but is wonderful for its scenery, good cuisine and productive vineyards. Three cultivars were selected from this region:

Sangiovese: Vigorous vines with red grapes capable of producing both fruity fresh wines consumed young as well as serious, concentrated and alcoholic wines suitable for aging for long periods.

Canaiolo nero: Productive red grape used for blending with Sangiovese in the traditional Chianti recipe.

Montepulciano is the productive red grape that is valued for its high yields of soft drinkable young wines. When the crop load is controlled, it is capable of making spectacular well structured and deep colored wines with great balance and depth.

Southern Italy: The Greeks colonized this region over 2500 years ago and dubbed the area *Oenotria* which means the land of wine. The cultivars that they brought with them are still widely grown today and can make spectacular wines. We selected two of the best for our trial:

Aglianico: A vine of low vigor that produces small crops of very flavorful red grapes capable of making very dense, dark tannic red wines capable of aging for many years. One of Italy's best red wine grape cultivars.

Fiano: A white wine grape that grows vigorously, but produces small loose clusters with a delicate pink blush. The wines are well structured with good acidity and a pear and apple flavor.

Spain: This country cultivates the most vineyard area on the planet, although many have very low yields due to a paucity of moisture. Their indigenous cultivars are thought to have multiple origins from both Roman and Greek origins, native vines and plant material brought by the Phoenicians.

Tempranillo: A productive red grape capable of making long lived red wines with good color, alcohol and tannic structure. It is also grown in Portugal where it is known as *Tinta Roriz* or *Aragonez*.

Monastrel: Moderate yielding red wine grape that makes well structured, dark and tannic wines with a very unique flavor profile. It is also grown in Southern France where it is known as *Mourvedre*, and is often blended with *Syrah*, *Cinsaut* and *Grenache*.

Garnacha: Very productive red grape used to make a wide array of wines including roses, simple fresh and fruity wines consumed when young, and long lived deep red wines. Also grown in France where it is known as *Grenache*, and Sardinia where it is known as *Cannonau*.

These vines were propagated on 5 C rootstock and planted either as dormant vines or green growers during the summer of 1994 and the spring of 1995. Missing vines in 1995 were planted as 5C rootstock plants and chip budded the following summer in 1996.

A Randomized Complete Block ANOVA design was used, with 6 replications of 10 vines planted for each cultivar. Vines were trained on a 5 wire vertical shoot positioned trellis system (VSP) with a fruiting wire at 32 inches in height. Both spur and cane pruning were used based on grower experiences in other regions. Over the vine sprinklers provided frost protection, and a drip irrigation system was used. Water was applied so as not to be a limiting growth factor, but also not to over invigorate the vines. Vines received approximately 9 gallons of water per week from late June until early October. The vineyard floor was initially tilled and then planted to a sod forming cover crop that was mowed. Standard pest management practices were followed for powdery mildew, leaf hoppers and mites, and weeds beneath the vines were controlled with both

pre- and post emergent herbicides. Bird netting was applied near veraison to protect ripening fruit from damage.

Harvest data began in 2000 when the vines were mature and their canopies completely filled the trellis. Observations were made on bud break, flowering, and veraison by surveying the vines weekly from early March to April, May to June, and July to August. Harvests were scheduled by weekly berry sampling and sugar testing. When fruit accumulated at least 23.5 percent brix, determined by random berry selection and testing with a refractometer, harvest was scheduled. The late ripening cultivars were picked when the growing season ended due to cool weather and rainfall, and further ripening became unlikely (early November).

When harvested, clusters on each vine were counted, picked and weighed. A composite sample of 100 berries was taken from each rep and analyzed for pH, percent brix, and titratable acidity.

Wine samples were made for selected cultivars using traditional enological methodology. Because samples were somewhat inconsistent, only general attributes of the wine are reported.

Vine identity was verified by European ampelographers and viticulture specialists including Anna Schneider (University of Torino, Italy); Vittorino Novello (University of Bari, Italy) Jean Michel Boursiquot (University of Montpellier, France), Giovanni Mattii (University of Florence, Italy) and Jesus Yuste Bombin (Agricultural Technical Institute of the Region of Castilla y Leon, Spain).

Results: Ampelographic Verification

Roussanne was misidentified and was actually a clone of Viognier. It was different from the clone of Viognier in our trial and was submitted to UC Foundation Plant Services as a new clone for certification. Other vines from our trial that were submitted to UC FPS included Fiano, Cortese, the clone of Syrah (Durell) and Montepulciano.

Results: Table 1: Phenological Data Summary of White Cultivars

Cultivar	Bud break	Flowering	Harvest	Vigor	Fruitfulness	Training	Average Bud Number
Arneis	Early	Early	Early mid season	Highly vigorous	Moderate	Spur	32
Cortese	Late	Late	Mid season to late	Vigorous	Moderate	Spur	30
Marsanne	Mid season	Mid season	Mid season to very late	Vigorous	Very fruitful	Spur	28
Pinot gris	Very early	Early	Early	Not vigorous	Light yielding	Cane	28
Fiano	Early mid season	Early	Mid season	Vigorous	Light yielding	Spur	32
Viognier	Early	Early	Early	Not vigorous	Light yielding	Cane	28

Results: Table 2: Phenological Data Summary of Red Winegrape Cultivars

Cultivar	Bud break	Flowering	Harvest	Vigor	Fruitfulness	Training	Average Bud Number
Aglianico	Very late	Late	Very late	Low	Low	Spur	32
Canaiolo nero	Late	Late	Late	Medium	Very high	Spur	30
Cinsaut	Very late	Late	Late	Low	Medium	Spur	30
Corvina	Mid season	Mid season	Mid season to late	High	Medium to high	Spur	32
Dolcetto	Mid season	Mid season	Mid season to late	Low	Very high	Spur	30
Freisa	Very early	Early	Mid season	High	Medium	Cane	28
Garnacha	Very early	Early	Mid season	High	Very high	Spur	30
Montepulciano	Very late	Late	Very late	High	Medium to very high	Spur	30
Monastel	Very late	Late	Very late	Medium	Medium	Spur	32
Nebbiolo	Very early	Early	Late	Very high	Low to medium	Cane	26
Sangiovese	Mid season	Mid season	Mid season	Very high	Medium to very high	Spur	28
Syrah	Late	Late	Mid season	High	Medium to very high	Spur	29
Tempranillo	Mid season	Mid season	Mid season	High	medium	spur	30

Results: Table 3: Average vine performance and wine grape chemistry, red wine grape cultivars, 2000-2004

Cultivar	Yield/vine, kilograms	Cluster number	Cluster Weight, grams	Average berry weight, grams	pH	Titrateable acidity, g/100ml	% Brix Sugar	Harvest Date Range
Aglianico	4.83	38.8	124	1.38	3.4	.61	22.9	10/29-11/7
Canaiolo nero	4.06	31.7	145	1.7	3.9	.41	23.5	9/7-11/6
Cinsaut	4.37	31.23	136	8.48	3.96	.40	23.9	9/25-11/6
Corvina	6.26	32.15	188	1.84	3.62	.50	24.5	10/4-11/3
Dolcetto	4.9	34.24	134	1.23	3.57	.47	24.4	9/20-10/17
Freisa	6.0	43.75	147.5	1.33	3.55	.59	24.8	9/14—10/31
Garnacha	6.3	38.13	170	1.39	3.54	.52	25.3	9/18-10/17
Montepulciano	7.0	38.75	182.5	1.86	3.60	.52	22.9	10/29-11/5
Monastrel	4.23	39.53	146	1.44	3.76	.41	23.78	10/12-10/29
Nebbiolo	4.85	21.74	186	1.35	3.48	.58	24.0	9/17-10/30
Sangiovese	7.15	47.46	152	41.60	3.41	.75	24.37	10/3-27
Syrah	5.8	47.36	122	1.22	3.68	.53	25.15	9/17-10/3
Tempranillo	6.1	36.3	152.5	1.78	4.0	.35	24.9	9/18-10/30

Table 4: Average vine performance and wine grape chemistry, white wine grape cultivars, 2000-2004

Cultivar	Yield per vine, kg	Cluster number	Cluster weight in grams	Average berry weight, grams	pH	Titrateable acidity, g/100 ml	% Brix sugar	Harvest date range
Arneis	5.3	38.6	140	1.47	3.75	.45	23.8	9/3-10/15
Cortese	3.42	31.6	113	1.64	3.8	.38	22.1	10/25-11/06
Marsanne	8.6	36.9	232.5	1.90	3.79	.38	24.4	9/27-10/29
Pinot gris	3.67	47.7	65.8	1.09	3.8	.45	25.25	9/3-9/26
Fiano	5.96	47.82	124	1.28	3.42	.60	23.47	9/10-10/5
Viognier	4.3	44.5	94	1.18	3.55	.62	26.0	9/3-10-3

Table 5: Wine Attributes, Red Winegrape Cultivars:

Cultivar	Color	Acidity	Tannins	Alcohol	Flavor
Aglianico	Dark Red	High	Strong	Low	Very fruity, surprisingly ripe for low sugar content
Canaiolo nero	Dark red	Moderate	Low	Moderate	Not very interesting
Cinsaut	Light red	Moderate	Low	Moderate	Good aromatics, very fruity
Corvina	Light red	High	Moderate	Moderate	Very fruity, good aromatics
Dolcetto	Dark red	Low-moderate	Moderate to strong	Moderate-High	Good fruit, tannic structure, ripe quality
Freisa	Medium red	High	Moderate	Moderate	Fruity, balanced but crisp and tart
Garnacha	Medium red	Low	Moderate	Moderate-high	Good aromatics, tannins are balanced
Montepulciano	Dark red	Moderate	Low	Low	Surprisingly good for low sugar content at harvest
Monastrel	Dark red	Low	Strong	Moderate	Strong wine that needs aging

Cultivar	Color	Acidity	Tannins	Alcohol	Flavor
Nebbiolo	Light red	High	Strong	Moderate	Very aromatic, good tannic structure. Needs aging
Sangiovese	Medium red	High	Moderate	Moderate-high	Great fruit flavors, good tannic structure and balance
Syrah	Dark red	Moderate	Strong	Moderate-high	Very interesting wine, good flavors, tannins and balance
Tempranillo	Medium	Moderate	Strong	Moderate	Good fruit aromatics, good balance in tannins and alcohol, acidity

Table 6: Wine Attributes, White Wines:

Cultivar	Acidity	Tannins and Structure	Alcohol	Flavor Comments
Arneis	Moderate	Low, simple	Moderate to High	Fruity, fresh simple wine
Cortese	Moderate	Low, simple	Low	Not interesting
Marsanne	Low	Good to complex	Moderate	Mineral, neutral, not very fruity
Pinot gris	Low	Good	Moderate to high	Interesting rounded wines
Fiano	Moderate to high	Complex	Moderate	Very interesting and flavorful
Viognier	Low to moderate	Simple	High	Very aromatic, long finish in mouth

Conclusions:

The cultivars that we tested in this trial were mostly successful in producing quality fruit that could be grown commercially in our region. Some proved marginal in their ability to ripen in our climate, including Cortese, Aglianico and Montepulciano (as they failed to average 23.5 percent brix sugar which is considered the minimum acceptable ripeness by most winemakers). These would doubtlessly perform better in a warmer climate. Many cultivars yielded below 6 kg per vine, which is a relatively low yield per acre (less than 4.1 tons). The vine density of this vineyard is low (622 vines per acre), and yields could be improved with higher density plantings and more bud numbers per vine.

It is clear that many of these cultivars could be well suited for high quality winemaking in the North Coast region. In fact, many have become commercially successful and are broadening the choices for both winegrowers and their customers.

Literature Cited:

Anderson, Burton, 1990: *The Wine Atlas of Italy*. Simon and Schuster, New York, New York. Pp. 14-18.

Robinson, Jancis, 1986: *Vines, Grapes and Wines*. A. Knopf, New York, New York.

Winkler, A.J. , 1962: *General Viticulture*. University of California Press, Berkeley, California. Pp. 54-62