Evaluation of 10 Wine Grape Cultivars in the Highland Springs Region of Lake County

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Summary

Ten winegrape cultivars were selected for evaluation and planted in a commercial vineyard in the Highland Springs region of Big Valley, Lake County, planted on Clear Lake Clay soil. The growing season at Highland Springs begins with bud break normally in early April and harvest occurs in October through November. Cultivars evaluated included Pinotage, Barbera, Dolcetto, Sangiovese, Grenache, Syrah, Cabernet sauvignon, Cortese, Cinsault, Nebbiolo, and Mourvedre. Mourvedre proved not to be reliably winter hardy, and most vines died. Cortese was incorrectly identified by UC Foundation Plant Material Services, and is in reality the Austrian cultivar Lemberger or Blaufrankisch. Throughout the course of the trial, achieving at least 23.5% brix sugar content was difficult for most of the cultivars tested. Only Pinotage reached full maturity in more than one of the three years that data was collected. Based on our experiences, all other cultivars are not suited to the site unless viticultural practices to enhance ripening are further investigated and adapted.

Introduction

Lake County is a fast growing sub-appelation of the prestigious North Coast American Viticultural Area. The region is high elevation, with most vineyards above 1300 feet; and the climate continental in nature, with cool, wet winters and short (for California) warm summers. The Highland Springs area is located in the south and west part of Big Valley, and the soils that this vineyard is planted on are representative of many sites in Lake County that are often planted to pears. In the part of the vineyard where this trial was located, soils are fertile, clay textured, seasonally poorly drained, and high in magnesium. When this trial was initiated in 1994, the feeling among wine grape growers and wine makers in the region was that evaluating cultivars not commonly grown would assist both wine makers and growers to find new choices for this young and expanding wine growing region.

Materials and Methods

The site selected is a relatively flat area with fine textured alluvial soils. The soil type is a Clear Lake Clay variant. These soils generally have moderate fertility, are moderately deep and seasonally poorly drained. The trial was planted into a commercial Chardonnay vineyard, and cultural practices applied to the trial were identical as used in the surrounding vineyard.

Eleven wine grape cultivars were chosen to represent a wide array of organoleptic and viticultural features. A list and brief summary follows:

- Barbera: An important red wine grape of the Piedmonte region of Northern Italy, noted for good color, tannic structure and acidity.

- Cabernet Sauvignon: The noble red grape of Bordeaux, and used as a standard to compare all prospective wine grape cultivars to.
- Cinsault: A large berried red table grape and wine grape from Southern France used for blending to soften larger tannic wines, and for rosè wines.
- Cortese: A high quality white wine grape grown in the Piedmonte region of Northern Italy from which elegant white wines are made.
- Dolcetto: A productive and compact red wine grape from the Piedmonte region of Northern Italy from which everyday flavorful wines are made. Wines are of good color, extraction and fruit.
- Grenache: A red grape valued for its flavorful, well structured wines, widely grown throughout the Mediterranean region, often blended with more tannic varietals for body.
- Mourvedre: A red grape from Southern France and Spain that produces deep, extracted tannic wines capable of aging. Often blended with Grenache and sometimes, Syrah.
- Nebbiolo: A noble Italian wine grape from Piedmonte, often compared to Pinot noir. This cultivar has exacting site requirements for soils and temperature. The wines are often lightly colored, very fragrant, acidic, tannic and extremely long lived.
- Pinotage: A hybrid of Pinot noir and Cinsault developed in South Africa. The wines are well structured, with good color and interesting fragrance.
- Sangiovese: From the region of Tuscany in Italy, this cultivar is the main ingredient in Chianti, and is also widely grown in Emilia-Romagna.
- Syrah: A noble red grape grown in the Rhône Valley region of France, it is also widely grown in Australia where it is known as Shiraz. Wines often have a fruity fragrance, are dark in color, with good tannic structure, and are capable of aging well.

A trial with a randomized complete block experimental design was planted on July 6, 1994, consisting of 5 replications of twelve vines for each cultivar for a total of 715 vines. Vines were grafted on 5C rootstock. Spacing of the trial is 6 feet between vines planted in 11 foot wide rows, for a plant density of 660 vines per acre. Vines were trained as bilateral cordon vines on a vertical shoot positioned (VSP) trellis with two pairs of movable foliage wires, and a single fruiting wire set at 32 inches. Vines were irrigated by a drip irrigation system in manner that water was not a limiting yield factor. Frost protection is accomplished by an impact sprinkler system that covers the entire vineyard.

Phenological data was gathered by visual evaluations on a weekly basis during bud break and bloom.

Harvest of the cultivars occurred when random field sampling of berries determined that most of the fruit was close to 23.5% brix sugar content. At each harvest, 100 berry samples were picked and cooled. The samples were then taken to a lab at either Steele Wines (1998) or the UC Hopland Research and Extension Center (1999 and 2000) to determine berry weight and wine grape chemistry, including pH, titratable acidity, and % brix sugar content. Each vine was harvested by counting the total number of clusters, and yield per vine (in kilograms). Fruit was then collected and crushed, and fermented into wine.

During the dormant season, all canes from each individual vine were gathered and weighed following

pruning. Degree days were determined by consulting with the UC IPM internet web site weather data base, which tabulates data from an electronic weather station at Kelseyville. A degree day calulator was used with a lower threshold of 50 degrees F.

Results:

Vine Establishment: The majority of the vines were established by the spring of 1998. The exception was the cultivar 'Mourvedre', which died out most likely due to winter kill. Mourvedre is a late ripening cultivar, and has considerable green tissue going into the fall. It is grown primarily along the Mediterranean rim where the weather is hot in the summer, and mild in the winter.

When 'Cortese' began to bear, the fruit was red, meaning that the selection was improperly identified. During a visit in 1996, Dr. Anna Schneider brought some bud wood back to Italy and budded it on several vines in order to study it more closely. She determined that the selection was actually 'Lemberger', a red grape from Austria also known as 'Blaufrankisch.' The varietal is native to Austria. It is also grown in Washington, and pleasant, soft-tannin, fruity wines are made from the fruit.

Vine Growth and Performance:

The weather during each season was quite different. 1998 was a relatively cool, wet and late year. Following are the phenological, yield, and wine grape chemistry data for 1998:

Phenological Data, Highland Springs, 1998

Cultivar	Bud Break Date	Cumulative Degree Days	Bloom Date	Cumulative Degree Days	Harvest Date	Cumulative Degree Days
Cinsault	4/24	85	7/2	829	No harvest	
Grenache	4/15	39	6/30	817	No harvest	
Lemberger	4/15	39			No harvest	
Syrah	4/18	61	6/2 6	757	No harvest	
Barbera	4/16	50	6/25	744	11/13	3022
Dolcetto	4/15	39	6/25	744	No harvest	
Nebbiolo	3/25	5	6/23	720	11/4	3005
Sangiovese	4/12	30	6/25	744	11/13	3022
Pinotage	4/15	39	6/23	720	11/4	3004
Cabernet	4/26	105	6/26	765	11/13	3022

**since this cultivar was unidentified at the time, R. Elkins opted not to collect data*

Harvest Data, Highland Springs, 1998

Cultivar	Date Picked	Average Yield per Vine (kg)	Average Clusters per Vine	Average Cluster Weight (g)	Average Pruning Weight (kg)	Vine Yield/ Pruning Weight*
Cinsault	No harvest					
Grenache	No harvest					
Lemberger	No harvest					
Syrah	No harvest					
Barbera		11.35	67	169	1.14	9.96
Dolcetto	No harvest					
Nebbiolo		11.84	52	227	0.80	14.8
Sangiovese		17.81	75	237	0.91	19.57
Cabernet		7.06	76	92	0.80	8.83
Pinotage		8.77	66	132	0.66	13.28

1999 was also a cool growing season, with a late start. As the summer progressed, it became warmer, and harvest was ahead of the previous season.

Phenological Data, Highland Springs, 1999

Cultivar	Bud Break Date	Cumulative Degree Days	Bloom Date	Cumulative Degree Days	Harvest Date	Cumulative Degree Days
Cinsault	4/28	130	6/22	810	No harvest	
Grenache	4/21	107	6/18	780	No harvest	
Lemberger	4/26	125	6/18	780	10/21	2931
Syrah	4/24	120	6/17	740	No harvest	
Barbera	4/23	110	6/18	780	No harvest	
Dolcetto	4/26	125	6/18	780	10/21	2931
Nebbiolo	4/21	96	6/16	672	11/5	3059
Sangiovese	4/23	110	6/16	672	11/5	3059
Pinotage	4/21	96	6/19	790	10/4	2720
Cabernet	4/27	127	6/20	800	No harvest	

Harvest Data, Highland Springs, 1999

Cultivar	Date Picked	Average Yield per Vine (kg)	Average Clusters per Vine	Average Cluster Weight (g)	Average Pruning Weight (kg)	Vine Yield/ Pruning Weight*
Barbera	Not harvested					
Dolcetto	10/21	6.08	37	164	0.89	6.8
Pinotage	10/4	11.45	78	146	0.62	18.5
Cinsault	Not harvested					
Grenache	Not harvested					
Lemberger	10/21	11.11	56	198	0.40	27.8
Cabernet	Not harvested					
Nebbiolo	11/5	3.89	25	156	0.46	8.4
Sangiovese	11/5	8.95	41	218	0.57	15.7
Syrah	Not harvested					

During the 2000 growing season, the weather was warmer and dryer, but larger crop loads required more heat and time to ripen the fruit.

Phenological Data, Highland Springs, 2000

Cultivar	Bud Break Date	Cumulative Degree Days	Bloom Date	Cumulative Degree Days	Harvest Date	Cumulative Degree Days
Barbera	4/24	60	6/8	583	No harvest	
Dolcetto	4/28	76	6/7	579	No harvest	
Pinotage	4/21	43	6/9	593	10/6	2818
Cinsault	4/28	76	6/10	603	No harvest	
Grenache	4/24	43	6/7	579	11/8	3037
Lemberger	4/28	54	6/9	593	No harvest	
Cabernet	4/27	70	6/9	593	No harvest	
Nebbiolo	4/21	43	6/9	593	11/3	3009
Sangiovese	4/23	54	6/7	579	11/3	3009
Syrah	4/26	66	6/7	579	No harvest	

Harvest Data, Highland Springs, 2000

Cultivar	Date Picked	Average Yield per Vine (kg)	Average Clusters per Vine	Average Cluster Weight (g)	Average Pruning Weight (kg)	Vine Yield/ Pruning Weight*
Pinotage	10/6	10.88	116	93	0.72	15.1
Barbera	No harvest					
Lemberger	No harvest					
Dolcetto	No harvest					
Grenache	11/8	15.98	80	199	1.15	13.9
Cabernet	No harvest					
Nebbiolo	11/3	9.81	47	207	0.98	10.0
Sangiovese	11/3	14.74	69	213	0.85	17.3
Cinsault	No harvest					
Syrah	No harvest					

The vines generally had large crops in 2000, and there was insufficient heat to ripen the fruit.

Fruit quality: 100 berry samples were taken from each replication of the trial and analyzed for % brix sugar with a refractometer. Titratable acidity was also determined, and pH analyzed with a pH meter. The following data were determined:

Fruit Chemistry, Highland Springs, 1998

Cultivar	Average Berry weight in grams	Percent Brix of Sugar	pH	Total Acidity (grams/100 ml)
Cinsault	No harvest			
Grenache	No harvest			
Lemberger	No harvest			
Syrah	No harvest			
Barbera	1.85	21.4	3.26	1.10
Dolcetto	No harvest			
Nebbiolo	1.42	17.8	3.39	0.86
Sangiovese	1.8	17.8	3.16	0.82
Pinotage	0.95	25.3	3.69	0.65
Cabernet	No harvest			

Fruit Chemistry, Highland Springs, 1999

Cultivar	Average Berry Weight in Grams	Percent Brix of Sugar	pH	Total Acidity (grams/100 ml)
Cinsault	1.67	20.5	3.30	0.68
Grenache	1.37	22.5	3.57	0.63
Lemberger	1.85	17.7	3.14	0.87
Syrah	1.26	17.6	3.70	0.65
Barbera	1.42	17.8	3.39	0.86
Dolcetto	0.95	25.3	3.69	0.65
Nebbiolo	1.04	20.1	3.42	0.74
Sangiovese	No harvest			
Pinotage	No harvest			
Cabernet	No harvest			

Fruit Chemistry, Highland Springs, 2000

Cultivar	Average Berry Weight in Grams	Percent Brix of Sugar	pH	Total Acidity (grams/100 ml)
Cinsault	No harvest			
Grenache	1.67	20.8	3.32	0.65
Lemberger	No harvest			
Syrah	1.26	20.5	3.43	0.64
Barbera	1.85	21.4	3.26	1.10
Dolcetto	1.26	17.6	3.70	0.65
Nebbiolo	1.38	17.7	3.41	0.86
Sangiovese	1.80	17.8	3.16	0.82
Pinotage	0.95	25.3	3.69	0.65
Cabernet	1.04	20.1	3.42	0.74

In all three seasons, % brix sugar was generally insufficient for quality wine, with the exception of Pinotage in 1998 and 2000, and Dolcetto in 1999. Acids were generally high, and pH values were low, which is expected in under ripe fruit.

Conclusions:

As a group, the cultivars selected for this trial did not ripen very well in the three years that this trial was conducted. Only Pinotage and Dolcetto were able to acheive complete ripeness, and not every season. Large crops and inadequate canopies created unfavorable fruit/shoot ratios, in all cases exceeding 5/1, which is considered to be the ideal ratio for quality fruit. Degree summations indicated that there was insufficient heat to fully ripen the cultivars, especially with the large crop loads and small canopies. Data from a similar trial conducted in Red Hills indicates that at least 3200 hours were required to ripen moderate fruit loads, and that big crops required as much as 3800 hours. At the Highland Springs plot, those heat summations were not achieved, and consequently, fruit didn't ripen before fall rains, mold and bird damage destroyed the crop.

It may be possible to grow these cultivars if crops were significantly thinned, or other strategies employed to enhance canopy growth and ripening. Otherwise, these cultivars would not be a wise choice for this location and soil type.

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