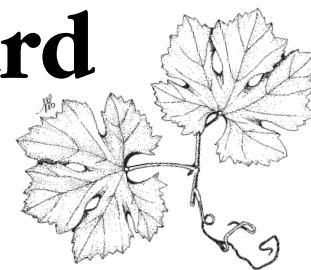


Zinfandel Heritage Vineyard

An Update

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Introduction

Zinfandel is a grape variety of noble stature. We in California are fortunate that it has no historical stylistic context elsewhere in the world that restricts our winemakers' creativity. Few New World wine regions have had the opportunity to create a new great wine. With other varieties, we have constantly compared our efforts to European standards. Zinfandel gives us an unparalleled opportunity to create unique world-class wines.

However, winemakers have commented—and even complained—for many years that the Zinfandel clones offered through UC's Foundation Plant Materials Service (FPMS) were not high quality selections. In short, the clones were disliked because they had large, tight clusters and large berries, leading to bunch rot at relatively low ripeness, and the resultant wines were criticized for having low intensity of varietal character. Prior to knowing Zinfandel's country of origin, it was not possible to improve the variety by importing better clones, as is the case for European varieties. However, knowing now that Croatia is the origin is not much help because the variety is not widely planted there, so the amount of variability would not be expected to be high.

Fortunately, however, numerous old Zinfandel vineyards survived Prohibition and many date back to the late 1890's. The reputation of old Zinfandel vineyards had been highlighted by winemakers, especially since the middle and late 1980's. Armed with these demonstrations of quality "in the bottle" throughout California and with the regional knowledge of UC farm advisors and local vineyard managers, a concerted effort was made to improve our UC Davis Zinfandel selections.

Collecting Field Selections

Zinfandel selections were collected from throughout the state. We felt that by making selections from throughout the state we increased the possibility of finding selections that distinguish themselves. Collections were made from Sonoma, Napa, Mendocino, Lake, Contra Costa, Alameda, Santa Clara, San Luis Obispo, San Joaquin, Amador, El Dorado, and Calaveras counties,

as well as the Cucamonga region of Southern California.

The selections made were from vineyards at least 60 years old and older because vines of this age appeared free of virus (visual "red leaf") symptoms. Attention was paid to finding vines with smaller berries and no disease symptoms. In addition to preserving these selections as a historical legacy, our goal, of course, is to choose from among them selections for distribution that will improve the quality of Zinfandel wines.

The Vineyard

The Zinfandel Heritage Vineyard, located in The Oakville Experimental Vineyard currently consists of 90 selections. Phase I, budded in 1995-6, consists of 63 selections and includes certified selections of Zinfandel (FPMS 1A, 2 and 3) as well as 3 selections of Primitivo (FPMS 3, 5 and 6). In 1999, we added Phase II to the vineyard, an additional 27 selections. Dr. Carole Meredith and her associate G. Dangl confirmed through DNA analysis that all the selections in Phases I and II are indeed Zinfandel. The vineyard is planted at 9 ft x 8 ft spacing (row x vine) on a Gravelly Bale Loam. St. George was used as the rootstock and the vines are head-trained and spur-pruned. Selections in the vineyard consist of 7-vine experimental units, without replication.

The planning for this vineyard was done with a strong appreciation that this was both a repository of plant material and a collection of historic material. Therefore, the vineyard was planted in as much of a traditional way as possible. Our use of St. George as the rootstock, nearly square spacing and head-trained spur-pruned vines supported only by split redwood stakes is a design much as you would have seen 100 years ago. One concession to modern viticulture was the installation of a subsurface drip irrigation system.

Virus Status

No evaluation of the Heritage selections can be done without knowing the status of each. Relying on visual inspections, every effort was made to select vines that were free of virus. However, we knew that tests would be needed to confirm the virus status of the selections. All selections were tested for grapevine fanleaf virus (GFLV) prior to budding.

Polymerase chain reaction (PCR) detection of virus in grapevines, completed in 1999, is now felt to be more sensitive than

traditional woody indexing. From this point forward, we will use PCR as the definitive virus test for this project. Of the viruses detected, grapevine leafroll (GLR) was by far the most common, with 46% of the selections infected with one or more of the GLR strains (data not shown). Other detected viruses were generally found in combination with a GLR strain. Only one selection that was free of GLR was found to have one of the other viruses. The number of selections testing positive for GLR was not anticipated, reminding us once again that the lack of red leaves in fall is far from assuring a negative virus status.

Viticultural Data

In 1998 we began viticultural evaluations of the selections in Phase I. These measurements are taken at harvest and include ∞ Brix, pH, TA, berry weight, yield per vine, cluster weight, cluster number and pruning weight per vine. Collection of yield per vine and clusters per vine began in 1999.

Table 1 reports mean data inclusive of all years. Yield, measured as the mean of three vines per selection, ranged nearly 3.5-fold, with a high of 7.7 kg and a low of 3.5 kg per vine. Mean yield was of 5.0 kg per vine. Brix values ranged from a high of 26.3 to a low of 23.2 with the mean being 24.2. Average cluster weights varied almost two-fold, from 170 g to 336 g, a combination of both berries per cluster and berry wt. In order for a selection to be given advanced consideration, vines must perform uniquely and consistently over time relative to other selections.

The Primitivo selections have their origin in Italy and therefore may represent a line of Zinfandel different from those we collected in California. When compared to the Heritage Vineyard selections as a whole, several general observations can be made. Primitivo selections (Table 1) all had values of yield, cluster weight, berry weight and berries per cluster that were equal to or lower than the mean for all selections. Primitivo FPMS 05 had both the lightest clusters and berries in the entire vineyard. Additionally, the Primitivo selections had values for clusters per vine and soluble solids that were above the vineyard mean. At this point the Primitivo selections, despite having more clusters per vine, seem to have lighter yields resulting from smaller berries and fewer berries per cluster that ripen earlier than most of the other selections in the Heritage Vineyard.

Table 1. Zinfandel Heritage Vineyard (Phase I) 1998-2002 harvest data (except as noted)

	1999-2002	1999-2002	1998-2001	1999-2001						
	Yield	Cluster	Cluster	Pruning	Pruning	Berry	Soluble	pH	TA	
	(kg vine-1)	Per Vine (g)	Weight (kg vine-1)	Weight (g berry-1)	Weight (∞ Brix)	Weight (g l-1)	Solids			
Entire Vineyard mean (n=61)	5.0	21	254	0.9	5.9	1.8	142	24.2	3.26	7.2
Stdev	0.9	2	35	0.2	1.2	0.2	17	0.6	0.05	0.5
High	7.7	25	336	1.5	11.0	2.2	183	26.3	3.41	8.8
Low	3.5	18	170	0.5	2.9	1.4	105	23.2	3.18	6.0
Primitivo Selections										
FPMS 03	4.2	24	190	1.2	4.1	1.8	109	26.3	3.26	7.5
FPMS 05	3.8	23	170	0.7	6.2	1.4	122	25.9	3.41	6.5
FPMS 06	4.1	24	181	1.0	4.9	1.7	105	26.1	3.32	7.2
UCD Selections										
FPMS 01A	4.9	19	274	0.9	6.2	1.8	153	23.7	3.24	6.9
FPMS 02	4.0	20	218	0.8	5.6	1.8	122	23.9	3.22	7.2
FPMS 03	3.9	19	229	0.8	6.0	1.8	128	23.2	3.28	6.7



The FPMS Zinfandel selections were singled out to investigate if their reputation as large berried, large clustered high-yielding selections was apparent. For no parameter do these selections set the high or low value for the vineyard. Nor do they fall outside the range set when looking at the mean \pm one standard deviation. In general, we can say that, up to this point, there is no data that distinguishes them from the Heritage selections.

Average yield data show a clustering between 4 and 6 kg per vine (Figure 1). However, it is interesting to note that the data for some selections is quite variable, as seen by the length of the error bars, for example, selections 25, 37 and 46. This means that the yield is not consistent from year to year. Among the selections with smaller error bars, we can see selections that are both on the high and low end of the yield range, meaning that they are consistently high or low. Virus status is identified

with different symbols in the figure and there is no correlation of virus status with either yield or variability of the data.

New Replicated Vineyard

We believe that we will not learn all we want about the Heritage selections without a fully replicated trial. The advantages are two-fold. First, we will have statistically valid comparisons, something that increases our confidence when we eventually want to make recommendations. Secondly, we will have much more fruit for winemaking trials. However, the large number of selections made a large vineyard impossible.

During 2001 we planted our new replicated vineyard. Deciding what selections to include in the replicated vineyard required us to construct a logical scheme. Within the Heritage Vineyard there are multiple selections made from the same vineyard, and some of the selections have been found to contain virus. Our scheme employed these

facts. Using the criteria virus-free and unique vineyards origin, we reduced the number of selections from 61 to 20. In the case of vineyards with multiple clean selections, we arbitrarily chose one selection unless we had previously made wine from one of the choices.

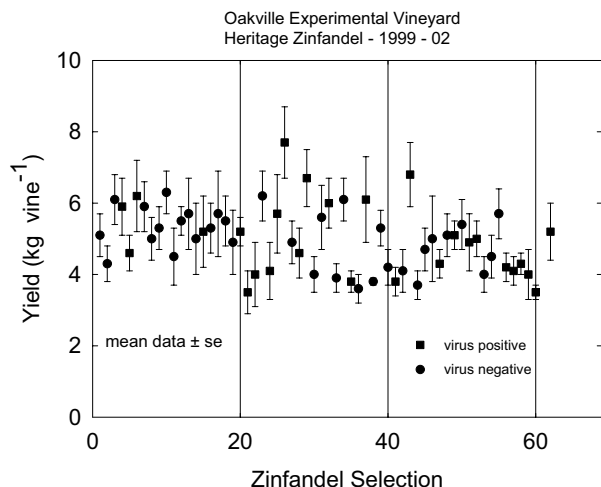
The new vineyard, like the original Heritage Vineyard, is located in the Oakville Experimental Vineyard's "Old Federal" vineyard and consists of 5 replications of 18 vines occupying 2 acres. Once again, we used St. George as the rootstock. The vines are planted at a spacing of 6 x 8 and will be head-trained and spur-pruned. We anticipate that this will produce 450 kg (1000 lb) of fruit per selection and that this will be sufficient to produce 1+ barrel of wine per selection. The rootstock was planted and the irrigation installed in 2001 and was budded in spring 2002. This vineyard represents our commitment to continued research on Zinfandel. This project continues to expand our understanding of Zinfandel and we are excited at what will be achieved.

The range shown in growth and yield parameters, seen thus far, fuel our hope that there is significant variability within the Zinfandel Heritage selections. Using the Heritage Vineyard as a base, we hope to identify Zinfandel selections that will achieve the status of clones and play important roles in the production in Zinfandel for years into the future.

The Zinfandel Heritage Vineyard is a collaboration between the Zinfandel Advocates and Producers and the American Vineyard Foundation. We are indebted to ZAP's Board of Directors and in particular to its Research Committee, and its Chairs Joel Peterson and Paul Draper, for their outstanding support. We thank the American Vineyard Foundation through which this research was funded.

The superb assistance of UC Farm Advisors: Rhonda Smith (Sonoma), Donna Hirschfeldt (Amador and El Dorado), Ed Weber (Napa), Glenn McGourty (Mendocino), Paul Verdegaal (San Joaquin), Jack Foott (formerly, San Luis Obispo) is gratefully acknowledged. The cooperation of UC emeritus viticulturist Amand Kasimatis, Ridge Vineyards viticulturist David Gates and the department's Oakville Vineyard manager Jason Benz is greatly appreciated.

Figure 1. Zinfandel Heritage Vineyard - mean yield 1999 – 2002. ■ = virus positive, ● = virus negative. Data are \pm standard error of the mean.



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