

# Warren J. Baker Endowment

*for Excellence in Project-Based Learning*

**Robert D. Koob Endowment** *for Student Success*

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## FINAL REPORT

*Final reports will be published on the Cal Poly Digital Commons website(<http://digitalcommons.calpoly.edu>).*

### I. Project Title

Effect of vine age on performance of *Vitis vinifera* L. cv. Zinfandel grapes and wines in the Central Coast of California

### II. Project Completion Date

December 2019

### III. Student(s), Department(s), and Major(s)

(1) Vegas Riffle, Agriculture and Environmental Plant Sciences

(2) Samantha Stauch, Agriculture and Environmental Plant Sciences

### IV. Faculty Advisor and Department

Dr. Jean Dodson Peterson, Associate Professor of Viticulture, Wine and Viticulture Department

Dr. Federico Casassa, Associate Professor of Wine Sensory, Wine and Viticulture Department

### V. Cooperating Industry, Agency, Non-Profit, or University Organization(s)

DUSI VINEYARDS

### VI. Executive Summary

Typically, most winegrape cultivars (*Vitis vinifera* L.) are commercially planted with the expectation being economically productive for 25 years. Generally, the longer the vines are kept in production, the larger the profit margin potential. Despite the economic advantage of prolonged production at a specific vineyard site, damage and decline by the root aphid, phylloxera (*Daktulospaira vitifoliae* Fitch), nematodes, wood root diseases, and/or poor management practices are all factors that contribute to decreasing vineyard lifespans. In addition to the aforementioned issues, natural reproductive and vegetative decline in old vines can also contribute to this trend. As a result of the rarity, production difficulty, and perceived increase of wine quality, “old” vines have become increasingly sought after by the industry and consumers.

Few studies have examined role vine age has in phenological development or wine chemical and sensory attributes. The purpose of this study was to determine the relationship of vine age on viticultural and enological factors in *Vitis vinifera* L. cv. Zinfandel.

This study consisted of a dry-farmed vineyard block in California’s Templeton region. The vines

are head-trained, spur pruned, and on 12 ft. x 12 ft. spacing. The block is randomly interplanted with varying ages. 'Young' vines were identified between the ages of 6 to 12 years old, and 'old' vines were identified as being 40 years of age and older. All 'young' vines were propagated from cuttings from the 'old' vines. All other vineyard management techniques were held to industry standard and were consistent throughout treatments. The study was a completely randomized design (n= 25).

Fruit from each treatment was hand-harvested when the vineyard sampled at commercial ripeness ( $25 \pm 0.5$  Brix), destemmed, and independently made into wine at an experimental scale (60 L fermenters, n = 3). Due to significant differences in brix accumulation throughout the season, a control treatment (proportional reflection of 'young' to 'old' vines in the block) was included. Sugar accumulation differences led to three different harvest dates for each of the three treatments so as to reach a designated harvest brix target. At harvest, Brix, pH, TA, and berry physical analysis readings were taken from randomly selected clusters. At pressing, wine chemistry, phenolics and color were measured. The juice was destemmed and inoculated with a commercial yeast strain and fermented. The experimental wines currently finishing malolactic fermentation. Once completed, the study will continue and include a trained panel for sensory evaluation.

## **VII. Major Accomplishments**

- (1) Successfully designed the experiment and gathered statistically significant data for the first year.
- (2) Over the course the past year, viticultural data for the first year's growing season was completed.
- (3) Conducted three different harvests in order to produce viable wine for enological and sensory analysis.

## **VIII. Expenditure of Funds**

Total funds allocated to this project was \$3,060. The budget included funding for student travel for conferences (registration, lodging, food and mileage) and operating expenses (laboratory consumables, chemical standards, vineyard supplies and materials and fermentation supplies). Student travel was funded through other grant sources. This was fortunate because we ended up needing to order a few parts to fix our LICOR 6400. The entirety of the funding was spent on supplies and services.

## **IX. Impact on Student Learning**

This experiment allowed several undergraduate students to have hands on experience with a large scale viticultural and enological research project. These students included a mix of senior project students, research students and volunteers. The undergraduate students worked collaboratively with the graduate student on this project. The students were tasked with many data collection components of viticultural research: internode and diameter readings, leaf water potential, pruning weights, cluster weights, maturity tracking, stomatal conductance, photosynthesis and phenological tracking. Students were also tasked with winemaking duties, monitoring, statistical analysis of collected data, and presentation of the project's findings. Meetings to review the project, discussing the findings and create an action plan for the next week were conducted weekly under the direction of Dr. Dodson Peterson and Dr. Casassa. Through management of the experiment's responsibilities, the students gained valuable knowledge in this field of study that is applicable to many other courses in this major. We are all grateful for this experiment.