Effect of Pruning Mechanization on Vine Performance and Fruit Composition of Chardonnay Grapevines under Warm Climate Conditions in the San Joaquin Valley of California

Progress Report (2000-2001) submitted to American Vineyard Foundation (AVF)

I. Project Title

Effect and Interaction of Clone, Rootstock, and Pruning Mechanization on Vine Performance and Wine Quality of Chardonnay Grapevines under Warm Climate Conditions in the San Joaquin Valley of California

II. Principle Investigators and Cooperators

Sanliang Gu, Ricchiuti Chair of Viticulture Research
Abdul Hakim, Post-doctoral Associate
Guoqiang Du, Visiting Scientist
Viticulture and Enology Research Center
California State University, Fresno

Ron Metzler
Metzler Family Farms

III. Objectives and Experiments Conducted to Meet Stated Objectives

The objective of this project is to determine the effect of pruning mechanization on vine performance and fruit composition of Chardonnay grapevines under warm climate conditions in the San Joaquin Valley (SJV) of California. The research proposed to evaluate the feasibility of pruning mechanization; to evaluate the vine vigor, yield components, and fruit composition of mechanical and minimal pruned Chardonnay grapevines; and to provide recommendations to grape growers for premium wine production of Chardonnay by selection of pruning mechanization practices in SJV.

The experimental vineyard of Chardonnay (clone 4) on Freedom was planted in 1995 at Metzler Family Farms. Vines were trained to designed trellis systems during dormant pruning in 1996. Row orientation is north to south with vines planted 6 feet apart in rows 10 feet wide. Vines are drip irrigated and fertilized according to the recommendation of University of California Cooperative Extension.

The experimental design is a randomized complete block consisting of three levels of pruning mechanization, namely mechanical pruning, minimal pruning, and hand spur pruning, with 4 replications. Mechanical pruning was established on the bottom wire with limited hand follow-up. Minimally pruned vines were trained to the top wire with no dormant season pruning. Hand spur pruned-bilateral cordon system was established on the bottom wire to retain 16 nodes per lb. of dormant cane prunings with balanced pruning.

Petiole samples were taken at full bloom and analyzed for major macro and micro nutrients. Light penetration into the fruiting zone were measured at veraison. Samples of 60-100 berries were randomly collected from each treatment replicate on July 27, August 2, 14, 28, September 8, 15, and 24. Samples were analyzed for berry weight, % soluble solids, titratable acidity, and pH. Total phenolics content will be analyzed for berries sampled at

harvest. Yield components included clusters per vine, cluster weight, and berry weight. Shoots were counted in January during the dormant season. Pruning weight and nodes retained will be recorded in February for vigor assessment. Data were statistically examined with analysis of variance and correlation for selected variables.

IV. Summary of Major Research Accomplishments and Results

Experiments conducted so far revealed that most of the parameters of yield components and fruit composition are significantly affected by pruning mechanization. Number of nodes retained and shoots was comparable for mechanical pruning and minimal pruning while hand pruned vines had fewer nodes and shoots. Light penetrating into the fruiting zone was greater in minimally pruned vines, compared to hand or mechanical pruned vines (Table 1). Number of clusters and yield were higher in minimally pruned vines than that in hand or mechanically pruned vines. Clusters were smallest in minimal pruned vines and largest in hand pruned vines while mechanical pruning produced medium cluster size (Table 2). Maturity was delayed by 9 days in mechanical pruning and by 34 days in minimal pruning, compared to hand pruning (Fig. 1). Brix and pH of harvested fruit were also different among the treatments. Juice pH was much higher and TA was much lower in minimally pruned vines when Brix was comparable (Table 3). Full bloom petiole N, P, and Mn were affected by pruning mechanization. Higher content of N, P, and Mn was found in hand pruned vines than that in mechanically or minimally pruned vines. Minimally pruned vines had higher Mn content which was comparable to hand pruning. Other mineral nutrients were not affected by pruning mechanization (Table 4).

V. Acknowledgement

The investigators and cooperators of this research project wish to thank the American Vineyard Foundation for its financial support. We would also like to thank the Metzler Family Farms for their help on vineyard management and data collection and staff and students at the Viticulture and Enology Research Center for their administrative and technical assistance.

VI. List of Tables