The Effect of Crop Load and Extended Ripening on Vine Balance and Wine Quality in Cabernet Sauvignon

C. McDonnell*[1, 2], Dr. Peter R. Dry[1], Dr. Robert L.Wample[3] and Dr. Susan Bastian[1]

[1]Discipline of Wine and Horticulture, School of Agriculture, Food and Wine, University of Adelaide, Waite Campus PMB 1, Glen Osmond, SA 5064 carrie.mcdonnell@student.adelaide.edu.au

[2] J. Lohr Vineyards and Wines, 6169 Airport Rd. Paso Robles, CA 93446 carrie@jlohr.com

[3]Department of Viticulture and Enology, California State University, Fresno, Viticulture and Enology Research Center 2360 E. Barstow Ave, Fresno, CA 93740

Farming for desired flavors and economic sustainability is an ultimate goal of viticulturists. This should be achieved through best management practices for a vineyard site. For as long as grapes have been grown, it has been known that the best wines come from those vineyards where vegetative growth and crop yield are in balance (Dry et al. 2004). Vine balance was defined by Gladstones (1992) by stating, "balance is achieved when vegetative vigor and fruit load are in equilibrium and consistent with high fruit quality."

Extended ripening has become a recent trend in harvest decision making in order to achieve optimum "flavor ripeness"; recognized as an important parameter for harvest decisions in wine grapes (Coombe 2001). Inadequate understanding of the later stages of ripening is limiting. Additionally, the practice of extended ripening causes yield loss from berry dehydration (Battany 2005, Grant 2005, Bisson 2001, McCarthy 1997a, Hamilton and Coombe 1992, La Rosa and Nielson 1956, Coombe 1975). Other problems may include: increased pest and disease susceptibility, shortened post harvest period (Grant 2005) and negative consequences of high alcohol wines (Bisson 1999). Minimal research exists on this practice. Crop load adjustment is commonly required for growers and contributes to significant yield loss. The relationship between crop load and wine quality has been and continues to be a prominent issue in viticulture research and farming (Keller et al. 2005, Chapman et al. 2004). Studies on crop load have been conflicting and warrant further research.

The aim of this study was to investigate the interaction of crop load and extended ripening on yield components, wine and fruit composition and to increase understanding of the synchronization of flavor ripeness with sugar ripeness through optimal vine balance.

In 2005, 2006 and 2007 a commercial vineyard of clone 8 Cabernet Sauvignon located in Paso Robles, CA was adjusted to four crop levels post fruit set. Each crop level was harvested at five target Brix levels from 22.5-28.5 Brix and fermented into wine. Yield components, wine and fruit composition, and wine sensory were measured and assessed on all replicated treatments.

Yield components were reduced from both crop load adjustment and extended ripening. Pruning weight increased in treatments thinned to lower crop levels in all three seasons, indicating changes in vegetative growth from the crop thinning. Average berry weight (Fig 1), cluster weight and berries per cluster were inversely related to crop load. Extended ripening increased wine color density (Fig 2). Additionally the lowest color density was consistently found in the lowest crop load treatments.

Results from the descriptive analysis characterized the wines, showing opposing differences between treatments harvested early (22.5-24.0 Brix) verses those which underwent extended ripening and were harvested at the 27.0-28.5 Brix target. Acceptability scoring and commercial grading showed that in general, wines from higher Brix levels in all crop load treatments were preferred. Furthermore, the most acceptable wines were from higher crop load and higher Brix treatments. These results suggest wine quality can be improved with extended ripening, although significant yield is lost. Additionally, lowest crop load does not always produce highest wine quality. Crop thinning may have detrimental effects on wine quality by disturbing the natural balance of the vine and increasing vegetative growth.

Figure 1: Effect of extended ripening on berry weight of four crop load treatments.

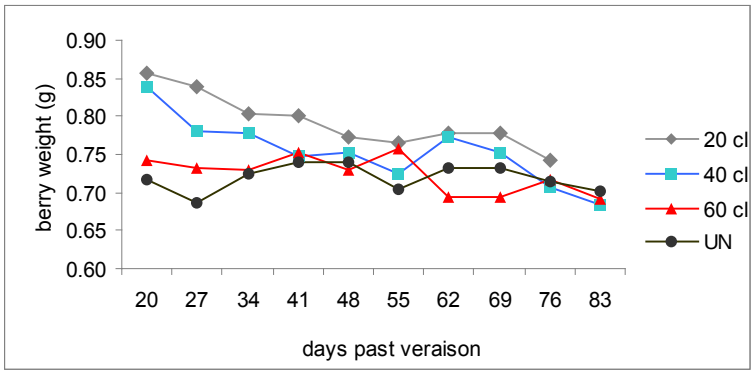
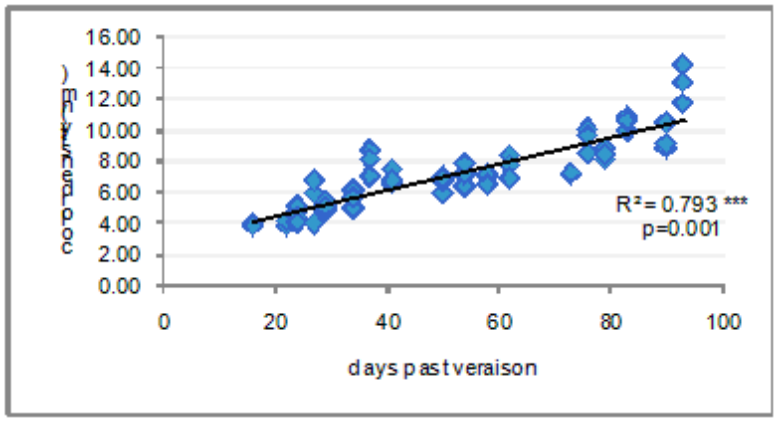


Figure 2: Effect of extended ripening on wine color density measured by spectrometer (420+520nm).



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