Response of fruit growth and composition of *Vitis vinifera* L. cv. Pinot noir to pre-and postveraison water deficits in a warm climate

Cody Copp[1,3] and Alexander Levin[2,3]

[1]Graduate Research Assistant, Department of Horticulture, Oregon State University, Corvallis, OR 97331;
[2]Assistant Professor, Department of Horticulture, Oregon State University, Corvallis, OR 97331;
[3]Southern Oregon Research and Extension Center, Oregon State University, Central Point, OR 97502

Deficit irrigation is used in wine grape production to achieve fruit quality goals like advancing ripening and increasing concentrations of phenolic compounds. The response of *Vitis vinifera* cv. Pinot noir to deficit irrigation is not well documented in the literature and is critical for warm, dry regions as well as cool winegrowing regions with warming climates. The objective of this study was to observe vine and fruit responses to early and late season water deficits and identify water status targets to guide irrigation scheduling. Irrigation treatments consisted of combinations of pre- and postveraison irrigation levels as fractions (100, 75, 50 and 25%) of estimated crop evapotranspiration (ET_c). Vine water status exhibited a strong positive relationship with applied irrigation in both years of the study, with more variation between years preveraison. Preveraison water deficits decreased berry mass and slightly reduced fruit yield. Total soluble solid (TSS) concentrations did not respond consistently to pre- or postveraison water status, though there is some evidence of a positive relationship between preveraison water status and TSS at harvest. Concentrations of phenolics (anthocyanins, tannins, iron-reactive-phenolics) exhibited a negative relationship with preveraison vine water status; the response was stronger in skin-associated phenolics, suggesting that the effect is linked to berry size. Postveraison water deficits also impacted phenolics, but the relationship was nonlinear and phenolics peaked at moderate water deficits (e.g. 75 and 50% of ET_c). TSS, berry mass, and yield were not sensitive to postveraison water deficits. Identifying water status targets depends on fruit quality goals, as preveraison deficits may increase phenolic concentration with potential penalties to vine yield and TSS. Preveraison water deficits increased phenolics linearly, but the effects are unknown beyond stem water

potentials of -1.4 MPa, below which was not observed in this study. Preveraison, ET_c-based irrigation requires frequent monitoring of vine water status due to the increased variability in response to irrigation. Postveraison water status values in the range of -0.9 to -0.5 MPa optimized phenolics concentrations, though this study did not observe the effect of postveraison water deficits below -1.3 MPa. Overall, postveraison water deficits appear to offer fewer benefits relative to preveraison deficits, but also pose fewer consequences and can be more consistently imposed with ET_c-based irrigation. This study summarizes the effects of moderate water deficits on yield and berry growth for Pinot noir in a warm climate and demonstrates the utility of preveraison water deficits for attaining fruit quality goals.