Efficacy of cultural practices for mitigating negative effects of Grapevine Red Blotch Disease in Oregon Pinot noir

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Grapevine Red Blotch Disease (GRBD) has been reported to impact vine physiology and fruit quality in *Vitis vinifera* by reducing photosynthetic rate, total soluble solids (TSS), and berry anthocyanin concentration. Currently, growers have few management strategies beyond removal of infected vines, which is particularly costly in young vineyards with high disease incidence. Two studies were established in 2018 and 2019 in commercial Pinot noir vineyards in Southern Oregon. Study A comprises a field survey to further characterize the impact and chronology of GRBD symptoms. Study B is a field trial which investigates the potential of cultural practices (irrigation, fertilization, crop load management) to mitigate the negative effects of the disease on vine physiology and fruit quality. Doubled rates (supplemental) of irrigation and fertilizer were compared against a grower control while crop load management compared thinning (one cluster per shoot) against no thinning. In Study A, GRBD reduced the rate of photosynthesis and stomatal conductance while increasing stem water potential and the leaf concentration of nonstructural carbohydrates. TSS, anthocyanins, and seed phenolics were significantly lower in mature fruit from infected vines. Study A largely confirms the impacts of GRBD reported in other studies but advances the understanding of the chronology of symptoms which may begin with an increase in leaf sugar concentration. The increase in leaf sugar appears to subsequently downregulate photosynthesis and thus induce foliar reddening, close stomates, and raise stem water potential. In Study B, supplemental irrigation significantly reduced disease severity (red leaves per vine) over two years, while supplemental fertilization had no significant effect and, in the second year (2019), thinning significantly increased severity. Supplemental irrigation and crop thinning significantly impacted vine physiology and fruit composition in 2019, but fertilization had no significant effect over two years. Photosynthetic rate, berry weight, and TSS were increased by supplemental irrigation. Supplemental irrigation did

not have consistently significant effects on secondary metabolites, but most often reduced anthocyanins and skin phenolics and increased seed phenolics. Crop thinning significantly increased berry weight, pH, and some secondary metabolite concentrations in berry skin. Irrespective of applied water amounts, maintaining a high vine water status was shown to be useful for directly counteracting many of the symptoms observed in Study A. Ultimately, these results suggest that routine viticultural practices such as irrigation and crop adjustment have the potential to mitigate the negative effects of GRBD on vine physiology and fruit composition.