



Influence of partial rootzone drying on the composition and accumulation of anthocyanins in grape berries (*Vitis vinifera* cv. Cabernet Sauvignon)

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- In “partial rootzone drying” (PRD), water is supplied to half of the root system, alternating sides in each cycle. The potential benefits are the reduction of vigor and the conservation of irrigation water, without causing yield loss.
- A previous study by one of the current authors showed that PRD vines had increased abscisic acid (ABA) levels, reduced stomatal conductance, and reduced midday leaf- and stem- water potentials as the season progressed. The goal of this study was to study the effect of PRD on another important parameter: anthocyanin composition.
- The experimental vineyard was a 5-yr-old Cabernet Sauvignon with a sprawling canopy. There were 3 treatments: 1) a control, where water was applied conventionally, 2) PRD, where a 40% reduction in water was applied to each half of the vine roots every 7 days, 3) a “shaded-cluster” control, and 4) a “shaded-cluster” PRD. The “shaded” treatments (which were only imposed in 2002/03) had the objective of evaluating the influence of light on the response of the fruit to PRD. They were conducted by placing dark boxes on the clusters from fruitset to harvest. The experiment was a randomized block design, with 3 replications per treatment, and ran for 2 seasons (2001/02 and 2002/03). Small-scale wines (18 liters) were produced from the various irrigation treatments only in the second season.
- **Effect of PRD on yield components.** In the first season, PRD significantly reduced berry size, even though yields were the same for both treatments. In the second season, PRD reduced both berry size and yield. The number of berries per cluster was not affected in either season.
- **Effect of PRD on fruit composition.** PRD significantly increased pH and decreased TA, when compared to the control. Brix was not affected. PRD also caused an increase in light (PAR) in the fruit zone.
- **Effect of PRD on grape anthocyanins.** PRD increased total phenols, but not the concentration of total anthocyanins. However, PRD changed the proportion of the various anthocyanins, which increased for most species, except for malvidin. In contrast, the effect of total shade on either the control or PRD was to reduce total anthocyanins, mainly the monoglucoside fraction (with the acylated and coumaroyl fractions somehow increasing with increased shade).
- **Effect of PRD on wine anthocyanins.** The changes observed in the PRD berries –increased concentrations of all anthocyanin types except malvidin, but the same amount of free anthocyanins– were maintained in the PRD wines. PRD also caused an increase in wine total tannin (14%), polymeric pigments (15%), and color density (14%). The authors attribute this increase in color to the increased polymeric pigments in the PRD wines.

In conclusion, the authors showed that the PRD vines receiving 40% less water than the control had the same total anthocyanin concentrations, but higher color density, higher total tannin, and higher polymeric pigments. The PRD vines also had smaller berries, with no -or small- reduction in yield. However, do we know whether the differences observed were due to the PRD method of applying water or to the reduced total water applied? Could conventionally-applied 40% deficit irrigation (DI) have given the same results? The current experimental design does not allow to answer that question.

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