



## Exclusion of sunlight from Shiraz grapes alters wine color, tannin and sensory properties

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These South Australian authors studied the changes that took place in grape and wine composition when they artificially shaded Syrah (Shiraz) clusters.

- In an effort to understand the changes caused by complete lack of light –or understand the berry components that are light-dependent-, these authors enclosed more than 400 Syrah clusters in opaque boxes prior to flowering. This provided sufficient fruit for berry analysis and for replicated small-scale winemaking. For comparison, they harvested and analyzed the same amount of nearby clusters exposed to normal light conditions (control). “Normal light conditions” in this case could be defined as dappled sunlight growing on a Scott-Henry trellis vines.

- **Effect of shade on berry composition.** Shading reduced the size of the berries by 20%. Shading also changed the ratio of seeds to skin in the berry: shaded berries had relatively heavier seeds, and relatively lighter skins. In agreement, shaded berries had about 50% more seed tannin, and less skin tannin, than control berries. The total concentration of anthocyanins was not affected by shading, but their individual composition was. But the most drastic effect was at the level of flavonols (such as quercetin, important in copigmentation), which were lowered to trace amounts in the shaded berries. This makes perfect sense, as flavonol accumulation is known to be light-dependent. Finally, both shaded and normal berries had the same Brix (suggesting photosynthesis was not compromised, as the foliage was not shaded, just the clusters). In contrast, TA and pH were higher in the shaded berries (suggesting increased malic and potassium levels).

- **Effect of shade on wine composition.** After making small-scale (18 L) wines in triplicate, the authors evaluated the effect of shading on wine composition at 3 times: at bottling, 8 months after bottling, and 3 years after bottling. Wine color (A520 and A420) was lower in the wine made from the shaded fruit at all 3 sampling times. Total anthocyanins (HPLC) were also lower in the wine from the shaded fruit, and this amount declined as the wine aged (lower at 3 years than right after bottling). Total phenols (spectrophotometrically) and tannins (HPLC) were also significantly lower in the wine from shaded fruit. The wines from shaded grapes had higher TA and malic acid, reflecting the higher pH and TA in the juice. Wines from shaded fruit also had lower alcohol and lower VA. Finally, the shaded fruit also had lower norisoprenoid levels (analyzed through solid phase micro-extraction). Norisoprenoids, such as  $\beta$ -ionone and  $\beta$ -damascone, are flavor precursors in grapes.

- **Effect of shade on sensory attributes.** A panel of 11 judges was trained to select appropriate attributes to describe the wines. Then, they rated the intensity of each attribute using a structured 9-point scale. The main differences this panel found were that the wines made from shaded fruit were much less astringent than the control wines. They also were lower in fruit flavor and in fruit flavor persistence. Interestingly, the wines from the shaded fruit were also perceived as having a green/stalky aroma, and had increased sulfide/reduction character. As the authors point out, the perception of lower fruit in the shaded wines might be a result of the masking effect of the increased reduction in these wines.

In conclusion, the artificial shading of grapes decreased berry size, flavonols, skin tannin, and norisoprenoids. In contrast, shading increased seed tannins, TA, and malic acid. Finally, shading did not have an effect on sugar accumulation (Brix) or on total anthocyanins –even though it did change the individual anthocyanin composition. Wine made from shaded fruit scored lower in mouthfeel and in overall fruit aroma. In summary, the authors proved that a high degree of shade was detrimental for both grape composition and wine sensory properties.

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