Addressing exposure of Chardonnay in Queensland vineyards – Part 2

By Ursula Kennedy[1*] and Robert Learmonth[1]

An extension project has been undertaken in a number of vineyard sites in Queensland over the 2009-10 growing season. This project, led by Ursula Kennedy and Robert Learmonth, from the University of Southern Queensland, has focussed on the effects of fruit exposure by way of different canopy management treatments on the fruit and wine quality of Chardonnay and Shiraz. The preliminary findings of the effects on Chardonnay were published in the March/April 2010 issue of *Australian Viticulture*. This article further discusses the impacts of exposure on fruit quality and also final wine quality.

Exposure is an important issue to growers and winemakers in Queensland as the state's vineyards are the most northerly and amongst the highest in altitude in the country, thus, they are subject to very high levels of ultraviolet radiation. Sun exposure in white winegrapes may result in increased phenolic concentration (Macaulay and Morris 1993) and berry shrivel and browning (Tarara *et al.* 2000), while in red varieties it can lead also to sunburn and can impair anthocyanin accumulation or, in fact, lead to degradation of anthocyanins (Haselgrove *et al.* 1999, Dry 2009).

The project

For this project, demonstrations were set up on vineyards located in the Granite Belt, South Burnett and Scenic Rim with growers invited to inspect the sites prior to harvest. Fruit from the Granite Belt site, located 820m above sea level, was chemically analysed and processed into wine for sensorial assessment. Fruit exposure techniques applied in this project included leaf removal from the fruitzone on either the most easterly (low – L) or on both sides of the canopy (high – H), done

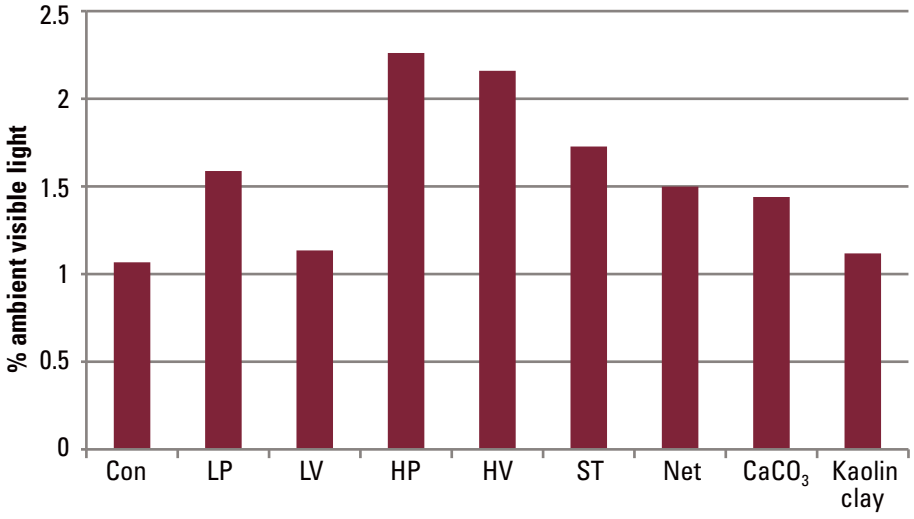

Figure 1. Percentage of ambient visible light on Chardonnay at the bunchzone.

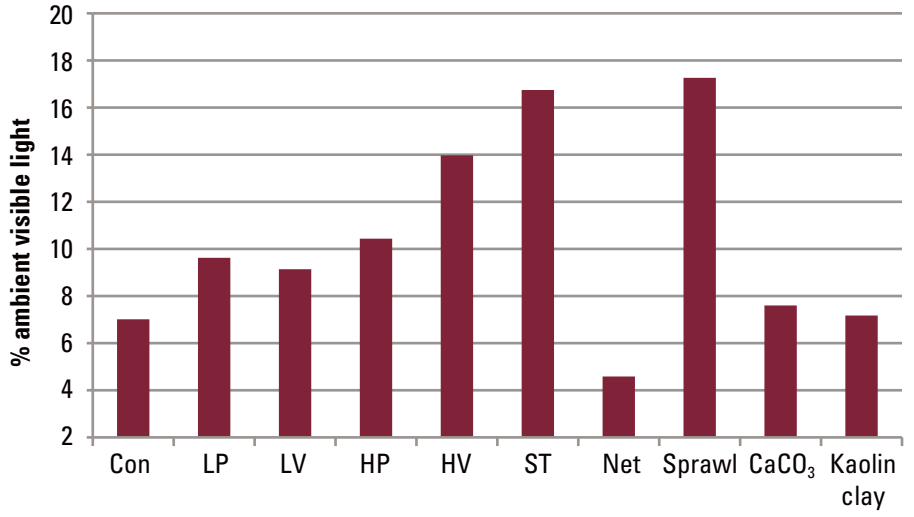

Figure 2. Percentage of ambient visible light on Shiraz at the bunchzone.

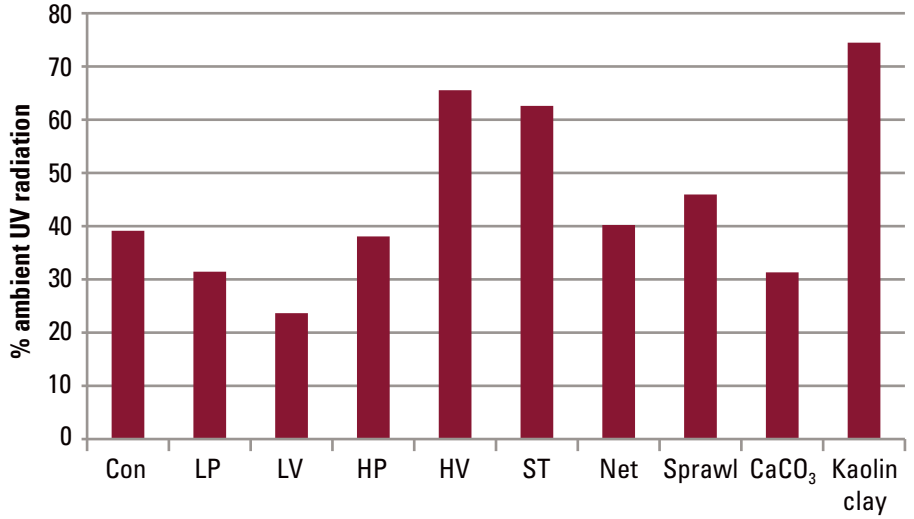

Figure 3. Percentage of ultraviolet light on Shiraz at the fruitzone.

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at pea size (P) and at veraison (V); 50% shoot removal (ST); throw-over bird net (Net); application of commercial 'sunscreen' products (calcium carbonate and kaolin clay); and a non-manipulated VSP 'control' (C), and 'sprawl' in the Shiraz.

The Granite Belt vineyard on which the demonstration was set was, unfortunately, subject to hail and frost events in late 2009, resulting in some damage to vines. This, combined with late-season water stress and disease pressures, impacted on the results of this trial.

Vine light measures

Visible light measures were taken in the vine bunchzones at veraison, with ultraviolet (UV) light radiation also measured in bunchzones of Shiraz. Visible light was measured by ceptometry and UV radiation by dosimetry, with the percentage of ambient radiation calculated for all treatments. As expected, the vines that were subject to leaf removal had the highest percent light penetration, the Shiraz shoot thinned and sprawl also had very high penetration while the Shiraz control and netted vines had the lowest visible light penetration. Light penetration into Chardonnay vines was not as expected; heavily leaf plucked and shoot thinned vines had the highest penetration while there was little difference between the others. It should also be noted that all Chardonnay vines had quite low light penetration, the vertical plane of Chardonnay canopies being quite dense.

UV light measures, taken only in Shiraz, again, indicated greatest UV radiation in the bunch zones of heavily leaf plucked vines. Interestingly, the other treatments all showed similar bunchzone UV conditions to the control. One point of interest is the slightly elevated UV shown in the vines subject to sunscreen sprays – it is possible that these sprays were actively reflecting UV light away from the surrounding leaves and bunches (Figures 1, 2 and 3).

Fruit analysis

Fruit was harvested when the vineyards were deemed ripe for commercial harvest. No appreciable differences were seen in measures of TSS, pH and titratable acidity between the different treatments for both varieties.

Spectral measures were carried out on fruit, in particular to assess total phenolics, anthocyanins for Shiraz and pre- and post-juice settling brown pigments for Chardonnay.

Shiraz vines subject to sunscreen sprays were slightly higher in phenolics than control vines, with all other treatments slightly lower. Results for anthocyanin concentration varied, with the vines to which sunscreen sprays were applied showing greatest anthocyanin accumulation, while the LP, LV, HV and ST vines were lower. It is possible that this is due to bunch exposure as the 'sunscreen' vines were subject to lower light exposure and the leaf thinned and ST vines higher. However, the results for other treatments are inconclusive, and it should be noted that day-time temperature showed similar trends for all treatments. The 4pm spike in temperature for the ST vines may be due to a lack of canopy uniformity as noted in the summary below.

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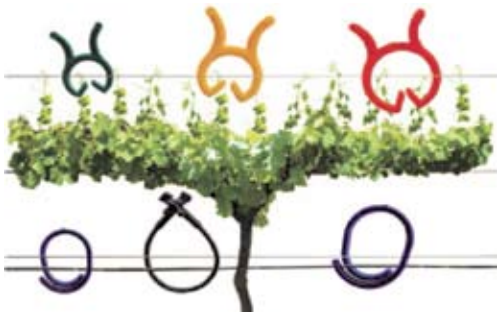

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For Chardonnay, the HP and HV treatments, followed by LP and LV and sunscreen sprays, showed the highest levels of phenolics and brown pigments pre-settling. However, in all treatments settling resulted in a decrease in juice total phenolics and brown pigments (Figures 4-7).

Wine assessment

Wines were assessed by judges at the Royal Agricultural Society of Queensland Wine Show and Mediterranean Challenge, using a flavour profile system. Similar trends were observed amongst all treatments for both Chardonnay and Shiraz with no obvious differences between treatments.

Conclusion

In conclusion, it should be reiterated that this vineyard was subject to a number of inclement weather events – frost and hail – early in the growing season. Vines suffered a degree of damage to shoots as a result of this, therefore, across the vineyard there was a distinct lack of uniformity. This, combined with some water stress leading to defoliation and disease pressures late in the season, resulted in the treatments not appearing to be appreciably different from each other. Nonetheless, there were some observations made on the quality of the fruit from the different treatments. Highly exposed fruit developed higher levels of sunburn, and the overall consensus from growers was that the control and netted fruit was of the best quality with regard to sun exposure.

This work is continuing with an analysis of the wines for Ca concentration and heat stability currently being carried out. It is hoped to repeat this project in the 2010-11 season, targeting a number of vineyards that have a lower incidence of frost and hail events.

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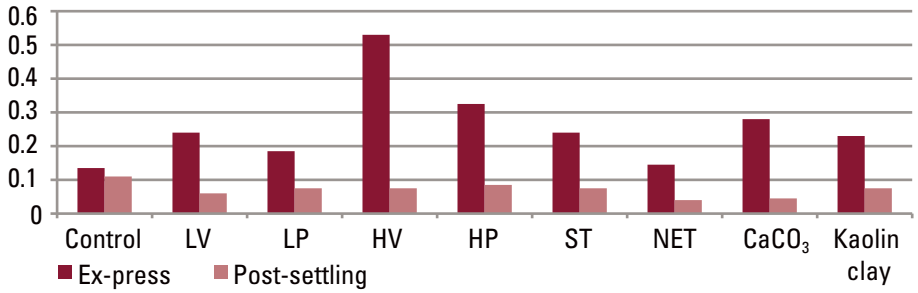

Figure 4. Chardonnay brown pigments.

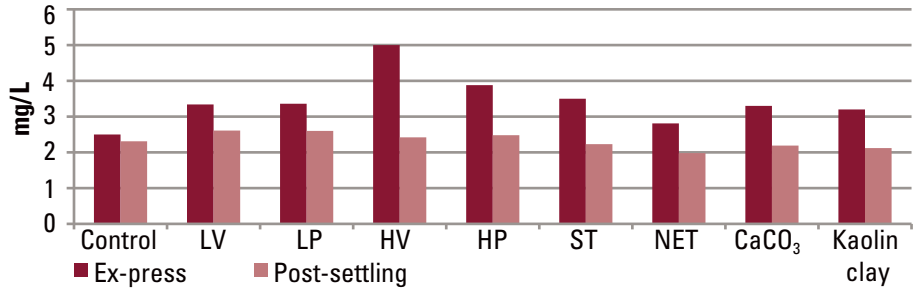

Figure 5. Chardonnay phenolics.

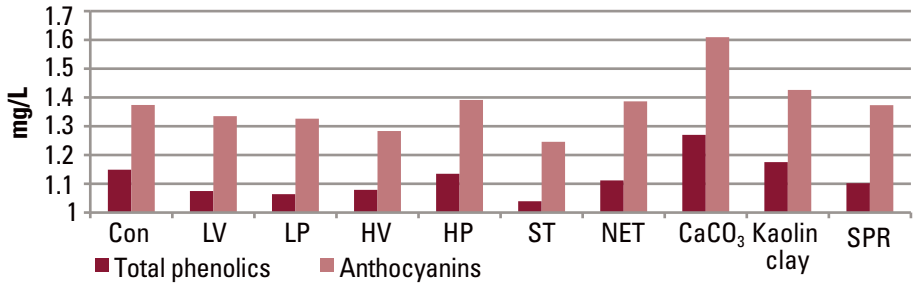

Figure 6. Shiraz phenolics and anthocyanins.

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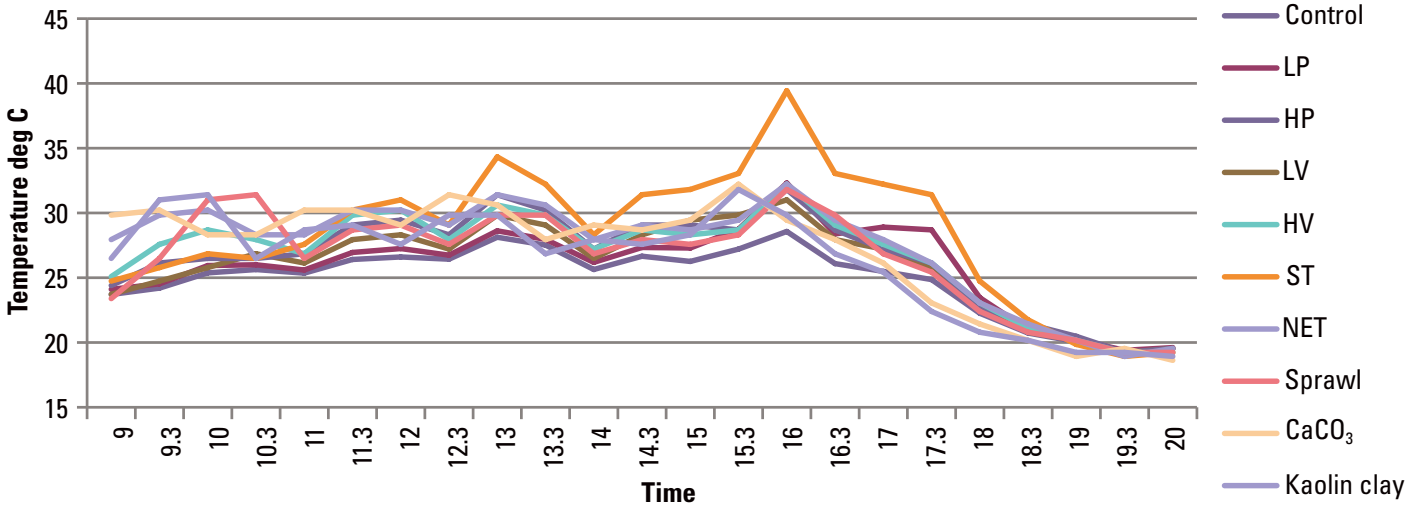

Figure 7. Shiraz bunchzone temperature – February 2010.

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