Evaluating methods for measuring fruit exposure

Paul Petrie¹,², Cory Black¹, Mark Krsic¹ and Markus Herderich¹

¹ The Australian Wine Research Institute, PO Box 197, Glen Osmond (Adelaide) SA 5064, Australia
² South Australian Research and Development Institute, Unley, SA 5064, Australia

Corresponding author’s email: paul.petrie@awri.com.au

Why measure fruit exposure?

Fruit exposure is a key driver of wine quality and style, due to both the direct light interception by bunches and the subsequent impact on bunch temperature. It is also one of the practical management variables a viticulturist can control (e.g. through irrigation or trimming). Measuring fruit exposure with current methods (e.g. a ceptometer) can be onerous (Meyers and Vanden Heuvel 2008).

Three contrasting methods

Fruit exposure was measured in Riesling in the Barossa and Eden Valleys. Vines were trained either with vertical shoot positioning or sprawling canopies and subject to a range of exposure treatments. Three methods for measuring fruit exposure were compared:

1) Traditional point measurements using a 0.8m array of light sensors (ceptometer) on one occasion (Meyers and Vanden Heuvel 2008).

2) Integrated estimates based on a hemispherical image (Figure 1) calculated over two weeks (Chazdon and Field 1987).

3) Integrated measurements over two weeks using a vial of light-sensitive Rhodamine WT dye (Figure 2, Bechtold et al. 2012).

Results from the exposure measurement methods were correlated against each other to determine their relative accuracy.

Results and Discussion

Measurements made using light-sensitive dye and through analysis of the hemispherical images were consistent for the sprawling and the vertically trained canopies (Figure 3b).

Results from the ceptometer were not consistent with the other methods (Figures 3a, 3c). This is likely due to the small number of spot measurements not accounting for the variation in light intensity over time.

Conclusions

The light-sensitive dye and the hemispherical images rapidly and consistently measured fruit exposure.

The hemispherical images could be analysed in real time with a smartphone and appropriate software.

With multiple sample times to account for the position of the sun and the canopy shape the ceptometer may give similar results to the other methods.

References

