

Initial Studies into Grape Bunch Temperatures of Field Grown Vines in Queensland

In recent years the focus of much research has been into the effects of light and heat on the composition of wine grapes. Some findings of this research has shown bunch light exposure to negatively impact on accumulation of anthocyanins (Haselgrove et al. 2000; Spayd et al. 2002) and flavonols (Downey et al. 2004) Bunch exposure has also been shown to increase berry temperature above ambient (Spayd et al. 2002). Findings of such research has led to many growers altering cultural practices in order to reduce bunch exposure and bunch temperature with the aim of increasing wine grape quality.

Traditionally the method for assessing fruit temperature has been to measure bunch zone temperatures often with sensors and data loggers *in situ*. Although providing a record of bunch zone temperature this method of temperature logging may not however represent the temperature of the berries themselves. Therefore this project aimed to compare the data recorded by bunch zone temperature data loggers with temperatures of directly exposed grape berries.

The project

This project was carried out in a vineyard located in Queensland's Scenic Rim wine region. The Scenic Rim region is situated west of Brisbane, encompassing the towns of Boonah, Beaudesert and Harrisville. At elevations ranging from 50 to 100 metres, vineyards range in size from 1 to 20 Ha, with a number of different wine grape varieties grown.

Shiraz was chosen as the variety on which to conduct this project, the project forming part of a larger study undertaken to benchmark S.E. Queensland Shiraz fruit and wine quality.

Temperature data were collated via three methods:

- 1) Small "i button" temperature data loggers were placed in the vine canopy in the fruit zone at veraison.
- 2) Infra red temperature measurements were made using a Therma Twin IR (laser) Thermometer and a FLIR i65 Camera.
- 3) A digital thermometer was used to measure the ambient temperature in a shaded area of the vineyard.

Image 1 – Data logger in Shiraz bunch zone



Temperature analysis

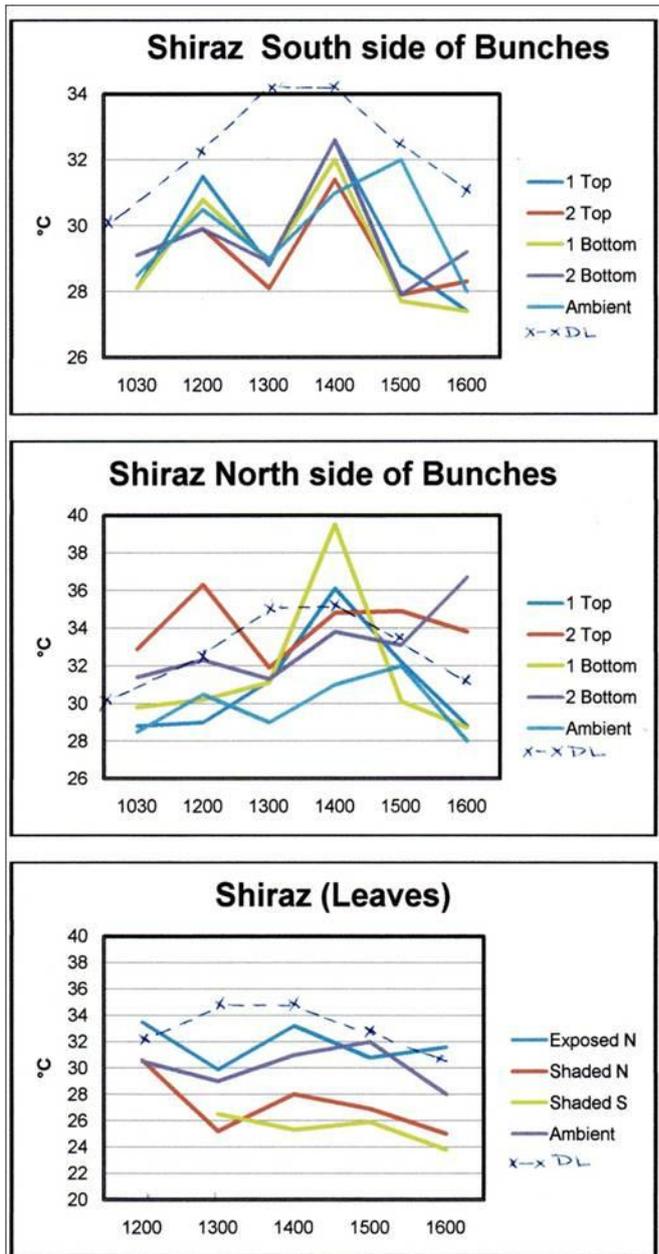
Temperature data were analysed to ascertain agreement between bunch zone data logger and bunch infra red temperature readings.

A) Data loggers vs Therma Twin IR (laser) Thermometer

Vines rows were NE-SW orientation, thus the southern side was shaded and the northerly side exposed. Readings were taken between 10am and 4pm on February 10th, 2010. Bunches measured were all in a similar position in the canopy to the data logger, with 2-3 leaf layers between the bunch and the vine exterior. Measures were also made of exposed and shaded leaf temperatures.

Although temperature readings, however the general trend showed that the temperature of shaded bunches and leaves were lower than temperatures recorded by the bunch zone data logger. More exposed bunches recorded higher temperatures than ambient, however variable results were seen when compared to the bunch zone data logger (Figure 1). This may be due to leaf movement and variable illumination of bunches with changing angle of the sun.

Figure 1 – Bunch zone data logger compared to bunch and leaf temperatures, February 2010



B) Data loggers vs FLIR i65 Camera imagery.

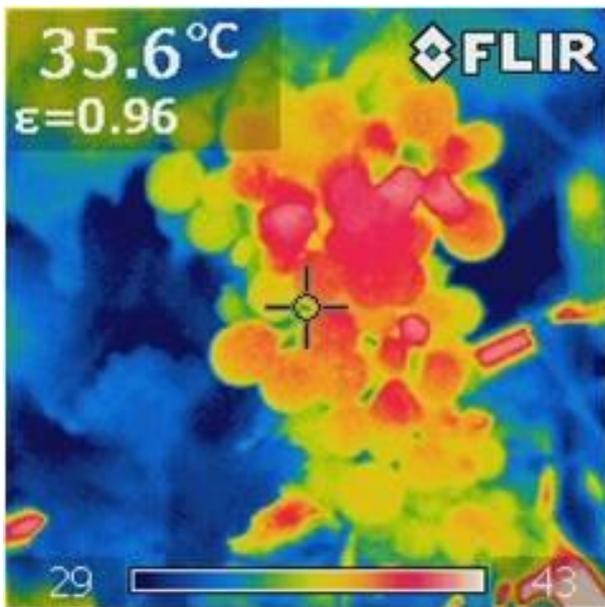
Comparisons were also made of data logger temperature and infra red imagery of the vine and bunch. These readings and images were taken at 10.30 am and 3pm on February 10th, 2010.

At both times readings and images were taken the infra red imagery indicated that fully exposed bunches reached temperatures well above ambient temperatures and maximum temperatures indicated by the bunch zone data logger. On both occasions data logger temperatures recorded a maximum of 31°C, maximum ambient temperatures were recorded as 31°C while grape surfaces under infra red imagery showed temperatures of between 36°C and 43°C. The highest berry surface temperature recorded by infra red imagery was 48°C.

Image 2 – Shiraz bunch 3pm - picture



Image 3 – Shiraz bunch 3pm - Infra red image



Conclusion

The 'take home' messages from this project so far is that data loggers in the bunch zone give a good representation of temperature of shaded bunches, however highly exposed fruit may be subject to temperatures well above those as indicated by a bunch zone temperature data logger. It is hoped to further this work by investigation of impact of berry temperature on fruit composition, and on the influence of vineyard floor management on bunch temperature.

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References

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