

When do grapes stop accumulating sugar?

Paul Petrie^{1,2,3,4}, WenWen Jiang², Keren Bindon², and Victor Sadras^{1,3}

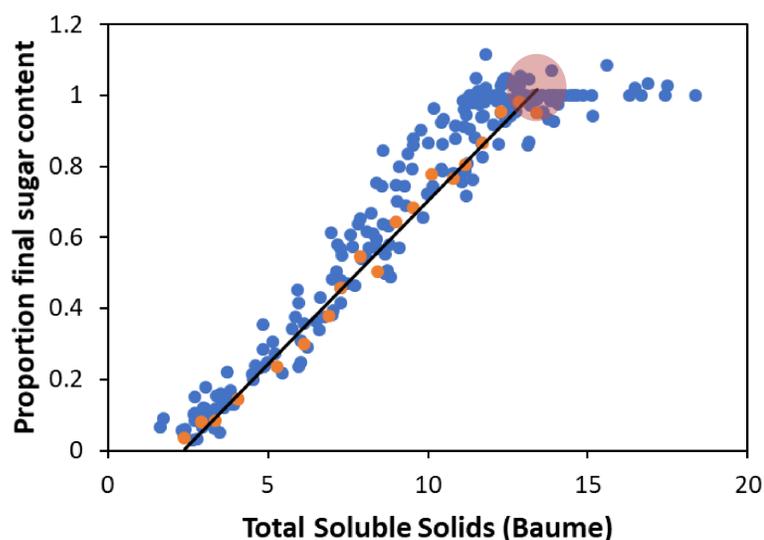
¹The South Australian Research And Development Institute, Waite Campus, Australia, ²Australian Wine Research Institute, Waite Campus, Australia, ³University of Adelaide, Waite Campus, Australia, ⁴University of New South Wales, Sydney, Australia.

Introduction

Over the last two decades grapegrowers and winemakers have observed grapes ripening earlier and over a shorter period. This can lead to a harvest with higher than ideal sugar concentrations and less desirable flavour characteristics. To help manage high-sugar grapes, FSANZ regulations now allow the pre-fermentation dilution of must to 13.5 °Baume. By establishing a lower limit for sugar concentration this has shifted the focus towards the mass of sugar produced, in addition to the mass of grapes harvested. Changes in fruit maturity and flavour profile are tracked as the fruit ripens; under the revised regulations knowing the point when sugar movement into the fruit ceases becomes an additional parameter to consider for optimising harvest decision making.

Materials and method

Berry sugar content can be tracked by measuring berry weight and sugar concentration (°Baume). At earlier stages of ripening both sugar concentration and content increase; but, as ripening progresses increases in concentration occur at the expense of berry size as the sugar per berry remains static and the berries dehydrate (Figure 1). A meta-analysis was completed of 36 Australian research articles where the amount of sugar per berry could be calculated on ripening grapes. Management and environmental factors can stop sugar accumulation. Hence boundary layer regression was used to empirically determine, across all of the regions and years, the maximum sugar concentration where the sugar content per berry stopped increasing.



Results

The Shiraz berries did not accumulate sugar above approximately 13 °Baume (figure 2) and for Cabernet Sauvignon this value was closer to 15 °Baume.

Figure 1: The changes in sugar concentration (top), berry weight (middle) and sugar content per berry (bottom) as shiraz ripens. The blue band highlights the point where sugar accumulation by the berries stopped and further increases in concentration were due to berry dehydration as the berry weight decreased.

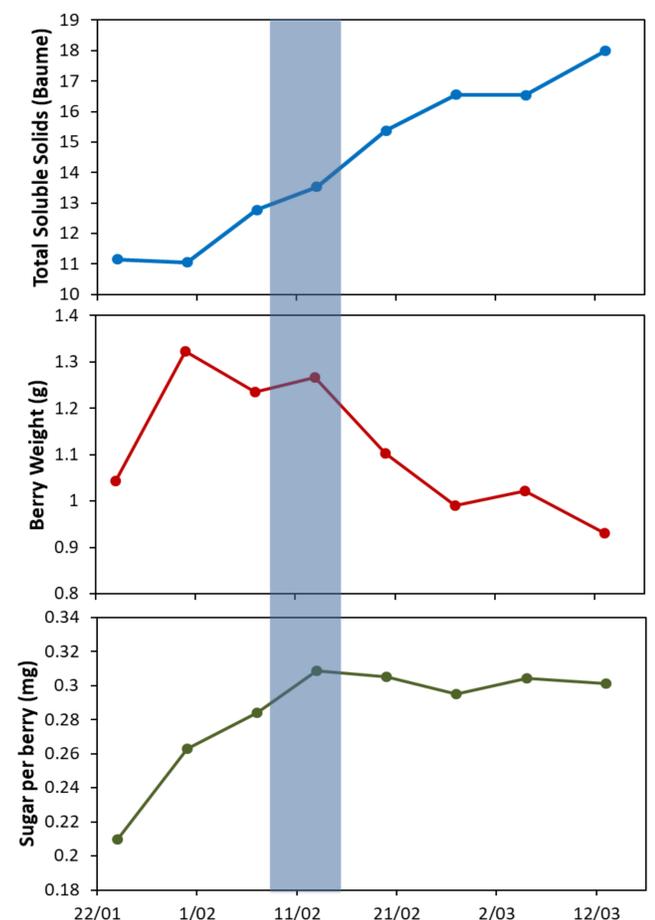


Figure 2: The relationship between the sugar concentration (Baume) and proportion of the berry sugar content for the final sample in each series (for shiraz). Blue points come from maturity curves collected from research articles, orange points are the 10th percentile for each 0.5 Baume range as used for the boundary layer regression. Where the regression line reaches 1 (red circle) is approximately where sugar accumulation has stopped.

Conclusion

As grapegrowers are paid based on the yield of grapes, conflict may occur between them and wineries when high sugar concentrations occur due to fruit dehydration. Knowing the sugar concentration above which dehydration is likely to occur will complement flavour assessment and maturity analysis when prioritising harvest decisions.

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FURTHER INFORMATION

Paul Petrie
P: +64 (0)400 950 125
E: paul.petrie@sa.gov.au

